INDUSTRIAL PHOTOGRAPHY

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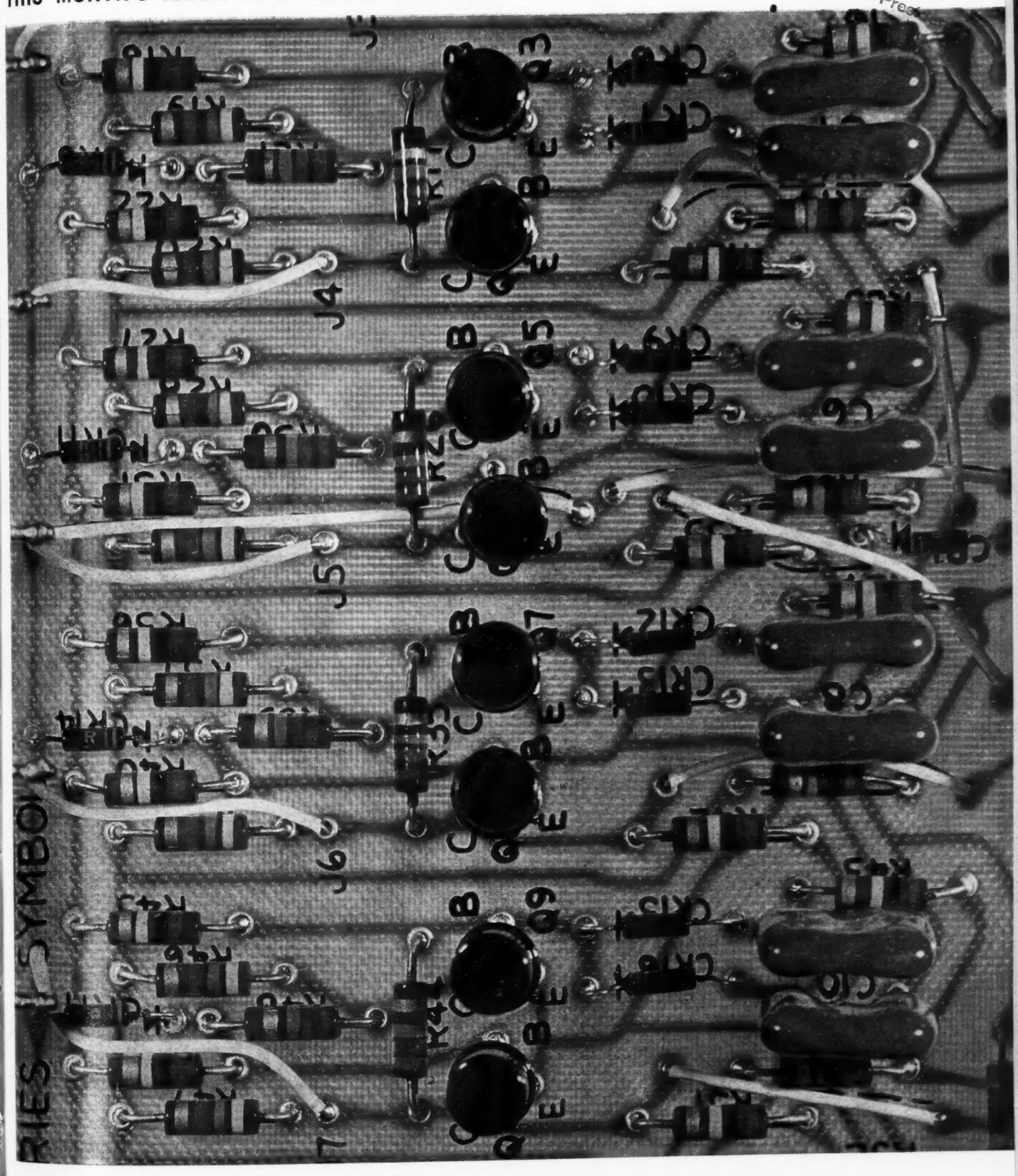

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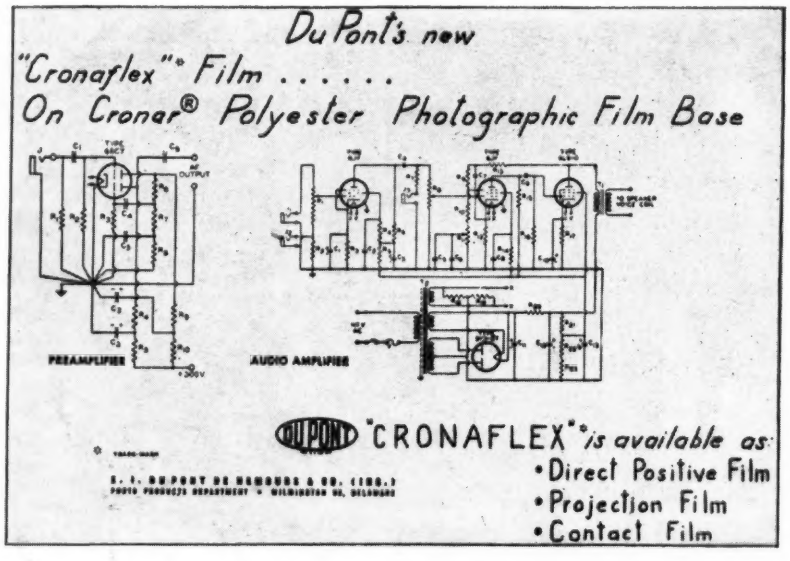

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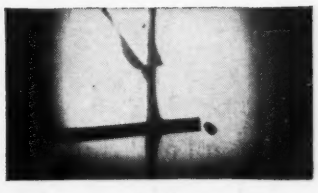
REACTOR-MATERIALS

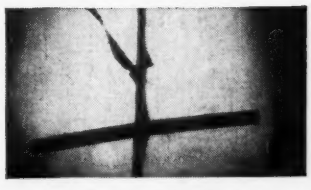
RESEARCH

hot-rod photography

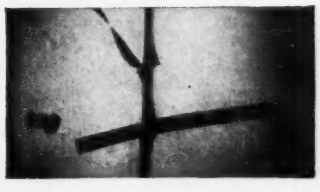
No 1—$t=0$



No 5—$t=320$ Microseconds



No 12—$t=880$ Microseconds



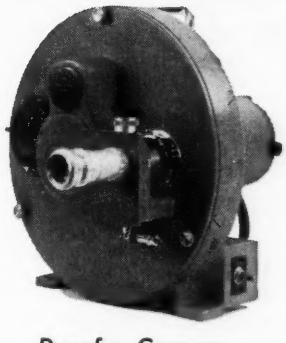
No 16—$t=1200$ Microseconds

No 25—$t=1920$ Microseconds

No 28—$t=2160$ Microseconds

Suppose a nuclear reactor runs away. What kind of materials would be required to contain the ejected reaction-control rods?

This was the question the U. S. Atomic Energy Commission asked Stanford Research Institute, who used a Model 326 Beckman & Whitley Dynafax Continuous-Writing Framing Camera to arrive at some of the answers.



Dynafax Camera

One of the tests used a line-throwing gun to fire ½-by 8-in. steel rods at a steel plate. The setup is shown above together with a few selected frames from the Dynafax sequence. No. 1, at time equals zero, shows the rod striking the plate. A subsequent frame shows the punched-out slug dropping away from the end of the rod.

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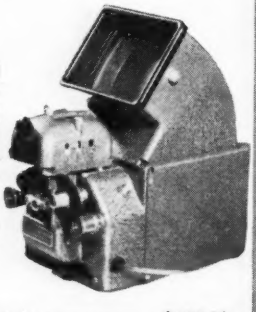

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Industrial Photography

THE MAGAZINE SERVING IN-PLANT TECHNICIANS
IN BUSINESS, INDUSTRY, GOVERNMENT AND SCIENCE

APRIL 1960 **SECTION I**

CONDENSING THE COLUMNS 4
A brief synopsis of what each regular columnist has to say this month.

ACCENT ON INSTRUMENTATION

A SURVEY OF HIGH-PRECISION FILM READERS 12
Earl Raguse tells what these vital tools do and traces their background.

SUPERSONIC RAINDROPS 22
The damage that rain can do to a jet at 600 m.p.h. is incredible. Measuring this impact requires precision equipment and plenty of know-how.

HIGH SPEED LIGHT SOURCES 24
Up at Cornell Aeronautical Laboratory they have come up with a very interesting and low-cost lighting rig that enables them to do vital Schlieren.

PHOTOGRAPHING THE UNSEEN 26
Have you ever heard of a precipitation band, let alone tried to photograph one? Whether you have or haven't, here's a curious little story.

TRAINED TO TRACK 28
War-surplus materials and ingenuity were put together at Ryan Aircraft and the result was a low-cost missile tracker that solved a high-cost problem.

COLOR SEMINAR: PART III 30
You asked for it, so here are some more questions about color photography answered by a panel of experts whose specialty is industrial color work.

TOMORROW'S LAB TODAY 32
Cape Canaveral's facilities have to be geared to the space age. They certainly are as evidenced by this rundown of what the boys at the Cape work with.

TECH MOVIES AT IBM 36
In-plant movies were costing too much at IBM. So, heads were put together and an inexpensive solution was created. Interested? Turn to page 36.

SETTING UP A COLOR LABORATORY 38
If the fear of high costs has kept you from setting up your own color lab, drop those fears. An expert in the field tells how to do it on a shoe-string.

REPRODUCTION IN INDUSTRY

LIGHTING FOR PRINTED CIRCUITS 40
Photographic printed circuits present unusual lighting problems.

DUPLICATING ORIGINALITY AT NORTH AMERICAN AVIATION 42
Some new wrinkles from a live-wire reproduction department.

ONE ANSWER TO A PRODUCTION BACK LOG 44
Richfield Oil has turned to incandescents. Here's Why.

ALSO: WAGES & OVERTIME, Page 46 . . . ASSIGNMENT TRADE SHOW, Page 48 . . . PHOTOGRAMMETRY AT KLM, Page 50.

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INDUSTRIAL PHOTOGRAPHY is published monthly by Photography in Business, Inc., affiliated with PHOTOGRAPHIC TRADE NEWS. Return 3547 forms to 10 East 40th St., New York 16, N. Y.

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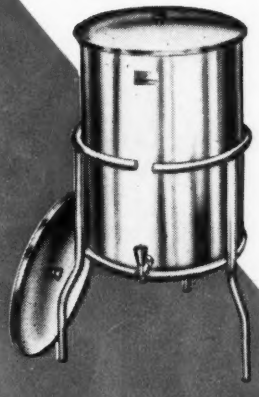

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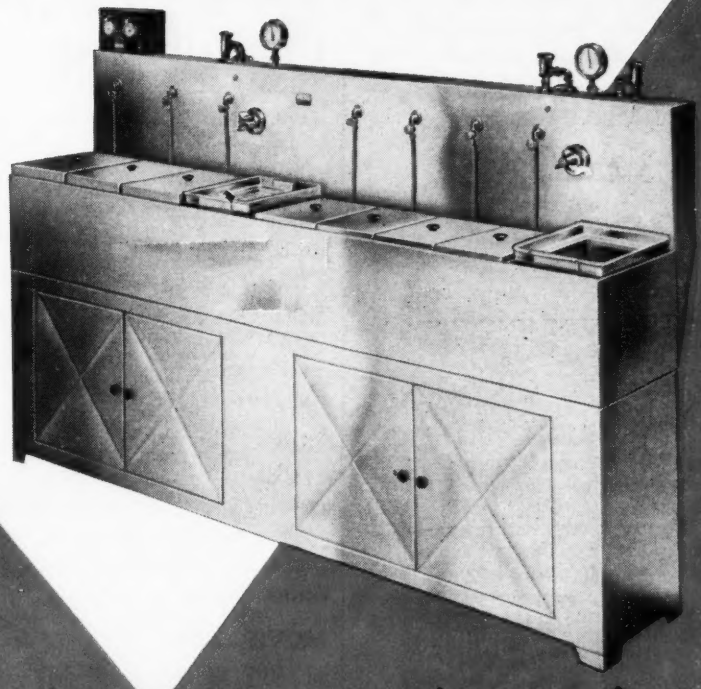

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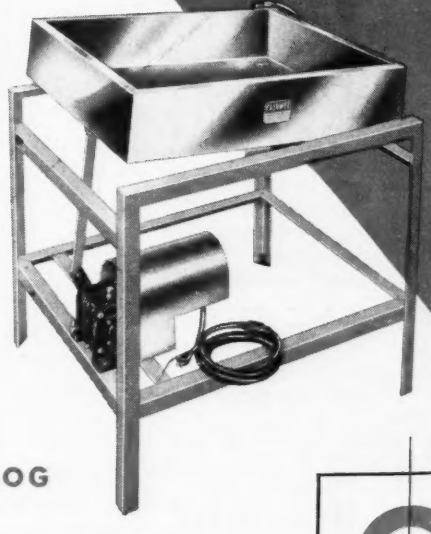

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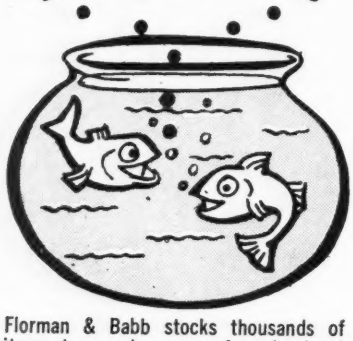

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Condensing the Columns

REPRO MANAGER (p. 8)
Denstman and Schultz explain why the production engineer's job is getting more complicated.

ROUNDTABLE (p. 10)
Roundtable columnist Morris Gordon, co-chairman of the ASMP conference, says this year's gathering in Miami will be the best ever.

TECHNICAL TRENDS (p. 16)
Learn why thermoplastic recording, a revolutionary process from GE's lab, is unlikely to replace motion picture film for the industrial moviemaker.

MOVIE CLINIC (p. 18)
How good is the new Ektachrome High Speed movie film with a dazzling 160 daylight rating? Read how the film stood up under tests.

About This Month's Cover

Saying electronics visually is a rough proposition as testified to by a host of industrial photographers. Our cover this month shows how top-notch free lancer Art d'Arazien solved it for The Martin Company. Using an 8 x 10 Deardorff with Ektachrome E-3 and Bardwell-McAllister 500W spots, he came up with the stunning shot of an electronic circuit board we have reproduced. It says electronics and instrumentation so dramatically that Martin has used it in a number of nationwide advertisements. These bring more plaudits for the versatile d'Arazien, a frequent speaker before industrial photographic groups.

PATENT NEWS (p. 52)
Dr. Sipley tells about the patent for a versatile exposure meter that measures color balance as well as light intensities.

ELECTRONIC FLASH (p. 60)
Harry Parker, president of American Speedlight, explains how light behaves and gives tips on getting more from your electronic flash.

COLOR CORRECT for '60

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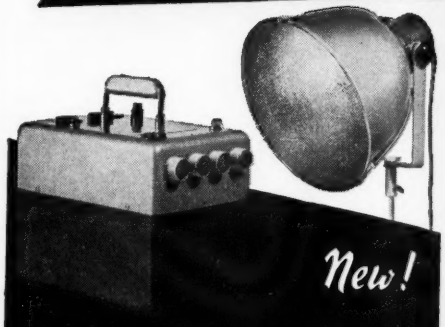

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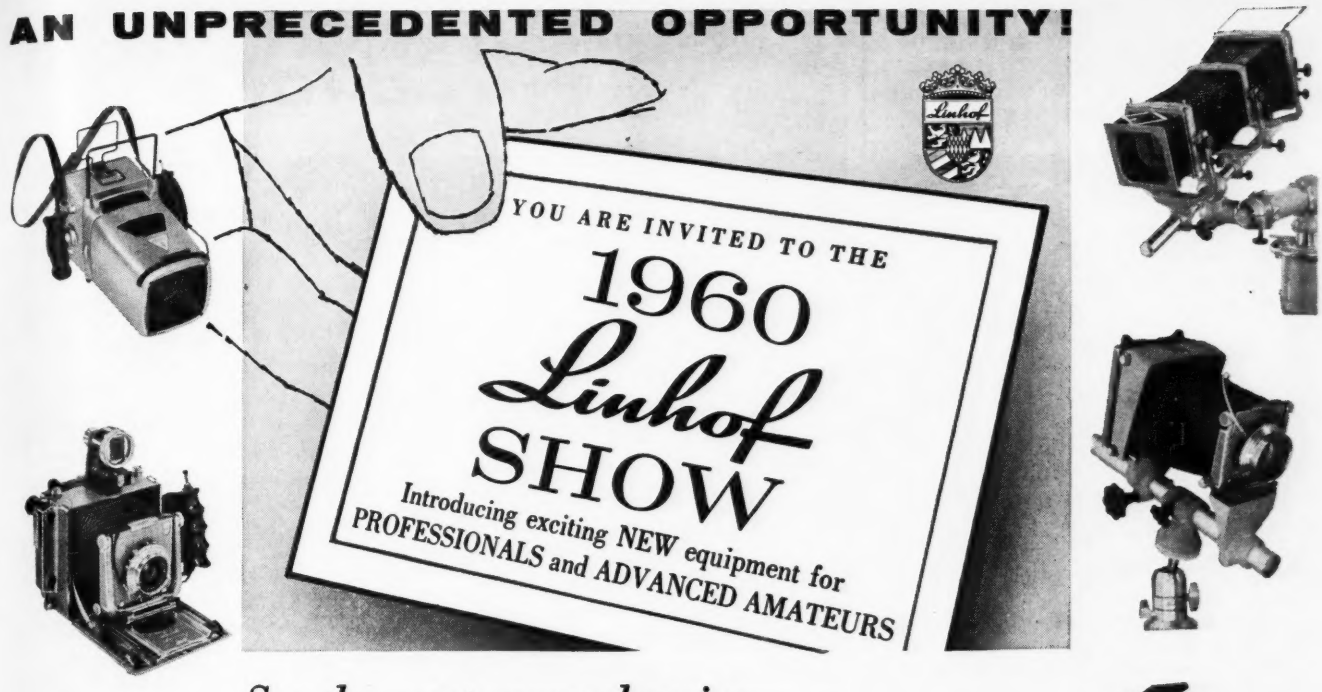

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BALTIMORE, MD.
May 7 • Cooper Camera Mart

BERWYN, ILL.
May 26 • Imperial Camera Shop

BEVERLY HILLS, CALIF.
May 14 • Beverly Hills Camera

BINGHAMTON, N. Y.
May 16 • Stickley-Siver

BOISE, IDAHO
April 23 • Idaho Camera

BOSTON, MASS.
April 28 • Claus Gelotte
May 13 • School St. Camera
June 6 • Ralph Harris

BRIDGEPORT, CONN.
June 11 • Jay James

BROOKLINE, MASS.
April 13 • Jon Allen

CHICAGO, ILL.
April 9 • Altman Camera
April 16 • Chromoptics
May 4-5 • Central Camera Exch.
May 19 • Camera Exchange

CLEVELAND, OHIO
April 11 • The Dodd Company
May 14 • Bryar Photo Supply

COLUMBUS, OHIO
May 3 • Don McAllister Camera

DALLAS, TEXAS
April 5 • Super Tex Camera

DAYTON, OHIO
May 6 • Salem Camera

DENVER, COL.
June 10 & 11 • Gart Bros.

DES MOINES, IOWA
June 2 • Eastman Kodak Stores

DETROIT, MICH.
April 23 • Detroit Camera
May 23 • Lobby Hobby

EUGENE, ORE.
April 16 • Hotel Eugene

FT. WORTH, TEXAS
April 7 • The Camera Shop

GARY, IND.
April 21 • Gary Camera

GLENDALE, CALIF.
April 9 • Ernie's

HEMPSTEAD (L.I.), N. Y.
June 17 • Eastern Camera Exch.

HOUSTON, TEXAS
April 11 • Southwestern Camera

INDIANPOLIS, IND.
April 15 & 16 • Post Photo Shop

JACKSONVILLE, FLA.
April 21 & 22 • Brandon's, Inc.

KANSAS CITY, MO.
April 29 • Crick's Camera Shop

LONG BEACH, CALIF.
May 21 • Camera Supply

LOS ANGELES, CALIF.
May 7 & 9 • Winter & Co.

LOUISVILLE, KY.
April 5 • Gatchell's

MIAMI, FLA.
April 1 & 2 • Gilpin's Photo Supply

MILWAUKEE, WISC.
April 1 • Reimer's Photo Materials
May 12 • Photoart Visual Service

MINNEAPOLIS, MINN.
April 28 • Century Camera

NASHVILLE, TENN.
April 26 • George C. Dury

NEWBURGH, N. Y.
April 15 • Seaman's

NEW HAVEN, CONN.
May 19 • Davenport Photo

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April 19 • Eastman Kodak Stores
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NEW YORK CITY, N. Y.
April 1 & 2 • Peerless Camera Stores
April 28 • Olden Camera
May 13 • Haber & Fink
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June 24 • Camera Craft 42nd St.

OAK PARK, ILL.
June 11 • Oak Park Camera Shop

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May 3 • Pipkin Photo Service

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April 23 • Alvin's

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April 6 & 7 • Williams, Brown & Earle

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April 18 • Peerless Camera Stores

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April 4 • Sandy's

RICHLAND, WASH.
May 7 • Kloster's

RICHMOND, VA.
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ROCHESTER, N. Y.
May 18 • Marks & Fuller

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April 21 • Stanley Photo Service

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May 26 • Olsen's

SACRAMENTO, CALIF.
May 27 • McCurry's

SALEM, ORE.
April 15 • Meier & Frank

SALT LAKE CITY, UTAH
April 8 • Deseret Book

SAN DIEGO, CALIF.
June 11 • Alex Camera Exch.

SAN FRANCISCO, CALIF.
April 25 • Brooks Cameras

SAN MATEO, CALIF.
May 14 • Foreman's

SANTA BARBARA, CALIF.
June 4 • Anderson's

SANTA CLARA, CALIF.
May 11 • Action Industrial

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April 2 • Clyed's

SPOKANE, WASH.
April 30 • John W. Graham

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May 20 • Pfile's Camera Shop

SPRINGFIELD, MASS.
May 6 • Valley Cinema

SYRACUSE, N. Y.
May 20 & 21 • Francis Hendricks

WASHINGTON, D. C.
April 22 • Capital Camera Exch.
June 24 • Fuller & D'Albert

WILMINGTON, DEL.
June 2 • Wilmington Camera

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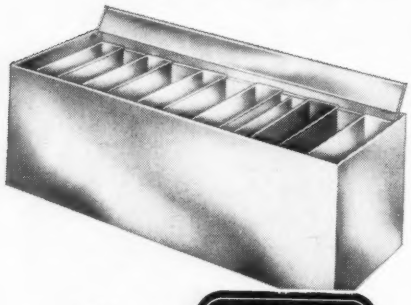
IN SECONDS



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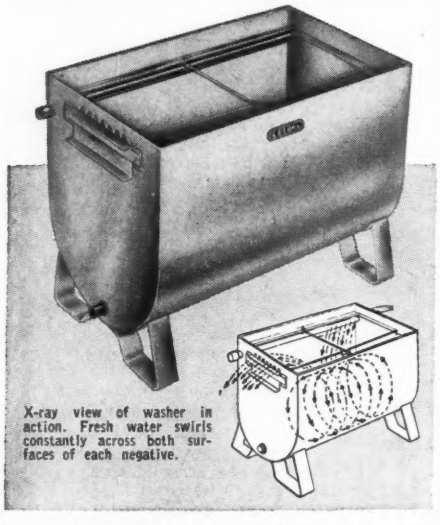

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Editor's Mail

MITCHELL BADLER, Editor

Hace ya muchos anos. . .

We are organizing the first school of photographic art in South America. A major part of the school's activities will be an international salon featuring the works of outstanding photographers from around the world. We are interested in nominations from you for candidates from the U. S. Fields covered will include commercial advertising, magazine, and industrial photography. — Elba G. De Vergara, Alfred Reifschneider Y Cia., Ltd., Augustina 1151, Santiago De Chile.

This is a rough translation (hace ya muchos anos que el editor estudio espanol) of a recently received letter. Interested readers are invited to send their nominations on outstanding photographers and their work directly to the company.

The Silver Fish Strike Again!

I have a set of INDUSTRIAL PHOTOGRAPHY magazines starting with the January 1953 issue and running to August 1958. The magazines are all intact and uncut. However, the silver-fish bugs have eaten into the bindings on some of the issues. These copies will need repairing but they are all complete. I will be glad to give them to anyone who can use them if they will pay the shipping charge. These magazines are too valuable to destroy but I have run out of storage room. — Emory O. Orton, P. O. Box 531, Pawhuska, Oklahoma

Interested readers are advised to contact Mr. Orton directly.

Rise of In-plant Filming

As a motion picture man I am really pleased to see the direction INDUSTRIAL PHOTOGRAPHY is taking. The present day in-plant film unit is more than just a technical service. Today it is beginning to take its rightful place in sales, public relations, advertising, training, engineering, etc. The calibre of film personnel, type and quality of work, plus management support and recognition are all improving. INDUSTRIAL PHOTOGRAPHY can be a potent factor in achieving this goal. — Robert Strickland, Lockheed Aircraft Corp., Marietta, Georgia.

ANNOUNCING

"The 1960 Annual Review of Audio Visuals in Business and Industry"

Ever since its inception, INDUSTRIAL PHOTOGRAPHY *has covered audio-visuals and their use in business and industry, both in regular and special issues. Now, in response to a growing volume of reader interest,* INDUSTRIAL PHOTOGRAPHY*'s editors have prepared a special feature supplement devoted exclusively to the use of audio visuals in business and industry.*

This supplement will be separately bound and distributed with the May issue. It is designed to bring the latest developments and techniques in movie-making, production of slides, filmstrips and other presentation aids to both management and technicians. Feature stories will stress the "how-to" aspects of preparing audio visuals as well as case history examples of "how the other fellow did it." The supplement will also include columns and departments on the latest in equipment and literature on business films, and on general news of interest to audio visual practitioners.

All of this is in addition to the regular edition of INDUSTRIAL PHOTOGRAPHY *with its regular features, columns and departments.*

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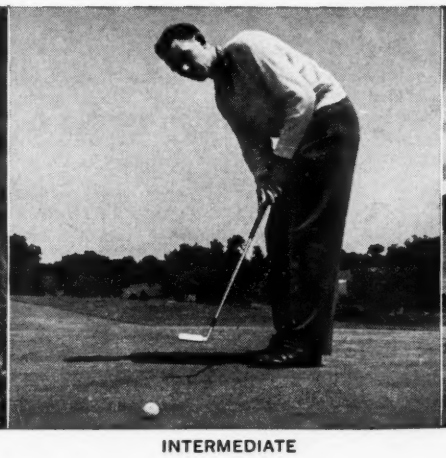
CLOSE-UP AT 4 INCHES



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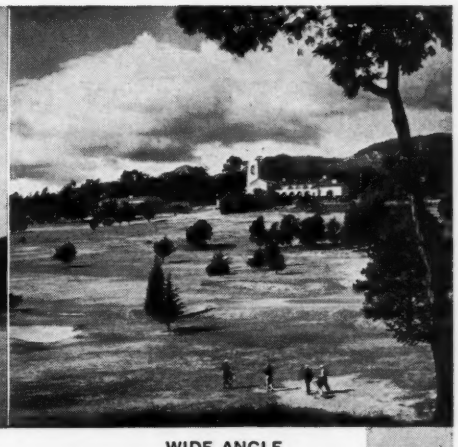

WIDE ANGLE

Exakta announces continuous focusing with Exakta and the New, remarkable Steinheil Auto-Quinaron Lens

Just imagine...with only one lens...you take pictures at infinity ...and close-ups of the same subject in life size or magnified... by simply moving in closer and closer to the subject while turning the lens!

Terrific isn't it, not to depend on extension tubes or bellows extensions! Virtually no exposure increase and no computations when time is a factor and the work is important.

You'll get the complete subject to fill the entire film frame especially with such small subjects as flowers, insects, coins, stamps, etc. You can even fill the film frame with only part of your subject as the petal of a flower, the head on a coin, etc.

What's more, the Steinheil Auto-Quinaron for Exakta is a 2-in-1 lens because it is both a GENUINE 7-element WIDE ANGLE lens and a CLOSE-UP lens too! It has a fast F2.8 speed and a focal length of 35-mm (62° angle of view). It is ideal for both color and black and white.

Not only does the Auto-Quinaron combine the latest advancements in optical design, but its fully automatic diaphragm mechanism is the most dependable ever designed!

Be sure to see the Steinheil Auto-Quinaron lens for Exakta, today, at your dealer. Price **$149.50,** list.

NEW, STEINHEIL F1.9 AUTO-FLASH QUINON 55-MM LENS WITH FLASH CALCULATOR—A NEW AND INVALUABLE FEATURE FOR EXAKTA

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This newest automatic lens for Exakta features a smart new calculating device which accurately computes and indicates diaphragm stops and distance settings for flash pictures! Its excellent correction renders maximum definition and fine contrast. This and its high speed rates the Auto-Flash Quinon outstanding for color and black and white photography.

Exakta Light-Meter IIa Camera with Built-in Electric Exposure Meter & Penta Prism eye-level viewfinder and automatic Split-Image Rangefinder and Direct Optical viewfinder with F1.9 Steinheil Auto-Quinon lens with flash calculator and fully automatic diaphragm.....$429.50, list

F1.9 Steinheil Auto-Quinon lens only, without camera.....$169.50, list

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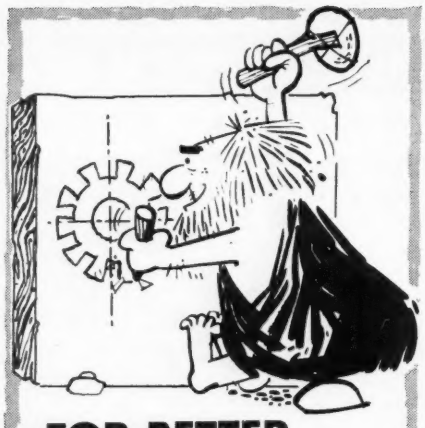

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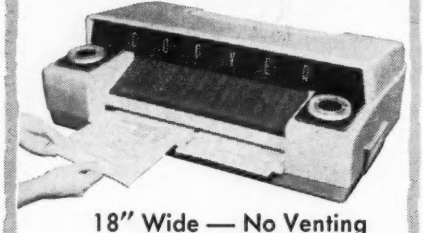

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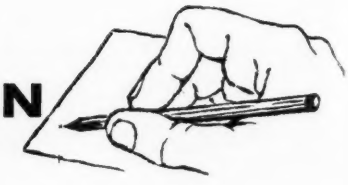
notes from the REPRODUCTION MANAGER . . .



by HAL DENSTMAN and MORT SCHULTZ,
Lockheed Electronics Co., Stavid Division

Complexities and Complications

The more complex equipment becomes, the more complicated becomes the job of the reproduction engineer. Take, for example, the method the military is now using to record information of a weapon's test.

A missile is fired. There has to be some way of recording its flight and other characteristics. This procedure is being handled by direct recording oscillograph tapes. The old-type standard graph method is impractical. It is too slow and often results in ink smearing or congealing.

Today's machines, such as the Honeywell Visirecorder, permit writing speeds up to 20,000 inches per second. Since these machines don't use old-type ink mechanisms, they can operate under practically any conditions of temperature, humidity, altitude, etc. They are ideal for recording information concerned with control applications, nuclear experiments, production testing, computing, pilot and component testing, medicine and many other test situations.

Electronic oscillograph recorders need no chemical processing to produce a visible image. The record is visible and readable without employing ink, electrostatic charge, chemical vapor or heat to bring it out. Recording papers are high-speed photosensitive materials, which are practically insensitive to normal room light, but which are extremely sensitive to ultraviolet light. In the machine, exposures on this paper are made by concentrating pinpoints of uv light.

When working with these tapes in the reproduction lab, they must never be exposed to an ultraviolet light source, such as sunlight or carbon arcs, before they have been fixed.

Reproduction engineers may be called on to reproduce portions of these records for filing purposes, for reports, for distribution to interested personnel or for other reasons. Before making the reproduction, the image must be fixed to render it stable. If not, it will turn dark and the tracing will be obliterated when the high intensity reproduction light hits it.

For our explanation of how to fix, we shall use Kodak's Linagraph Direct Print Paper as our subject. This paper, which is a print-out photo recording material designed for use in certain oscillographs, is commonly used for recording data. It provides an immediate visible record without chemical processing, producing a blue trace on a tan background. This is converted to a black trace on a light gray background after permanizing with Kodak Permanizing Developer.

Development of Linagraph paper in this developer is for about 75 seconds, followed by a 10-second rinse in a stop bath and a 60-second fixing period in a standard fixing solution. During fixing, apply continuous agitation. Then wash the tape for about 20 minutes in running water. Do not try to replenish the developer. Discard it when the recommended amount of tapes have been developed.

Another method recommended by Eastman Kodak for permanizing Linagraph paper is a 10 to 20-second bath in a 30% solution of Kodak acid fixer, fol-

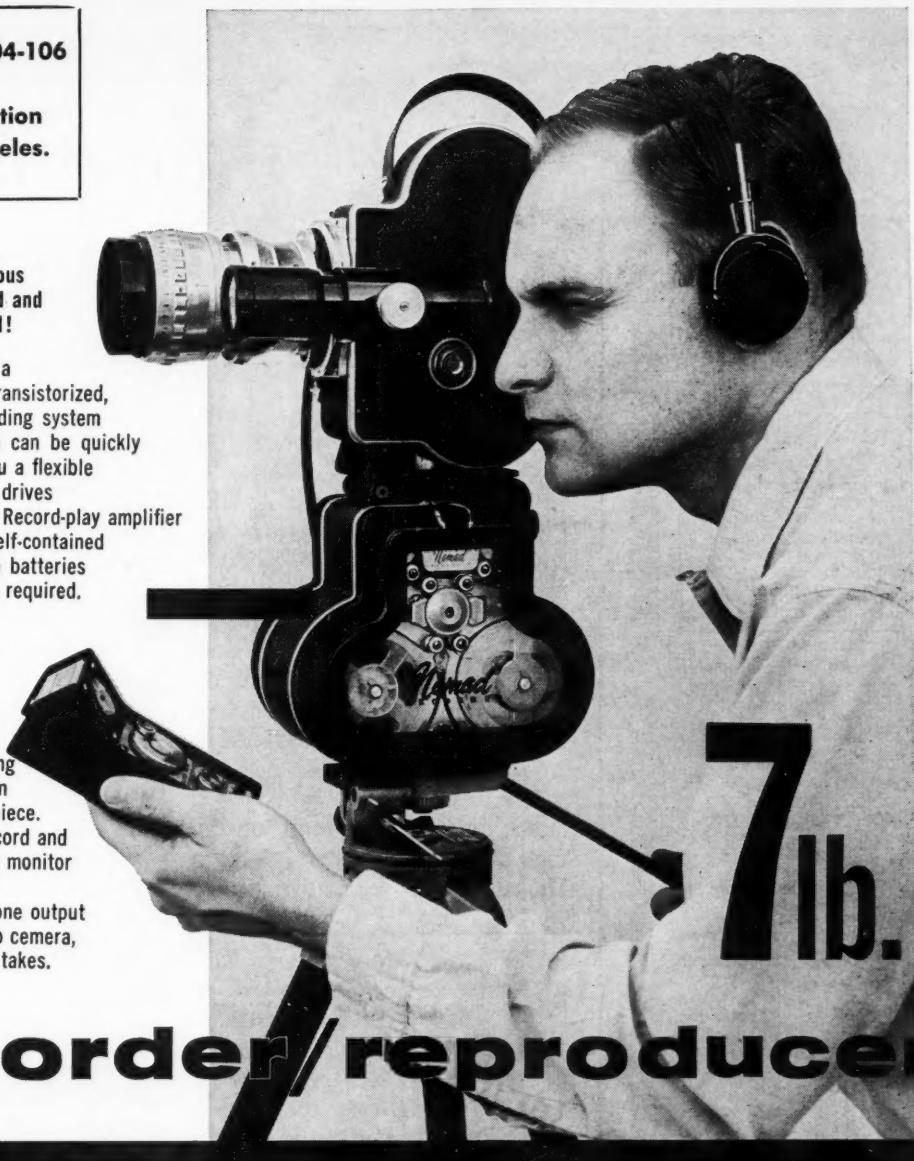
continued on page 62

Visit our booth #104-106 during the S.M.P.T.E. Convention May 1-6, Los Angeles.

At last...
all the answers for the serious cinematographer with a need and desire for professional sound!

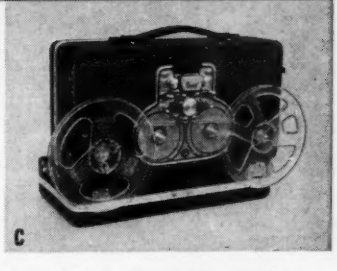
This precision instrument is a completely self-contained, transistorized, portable and versatile recording system to which any 16mm camera can be quickly mounted and interlocked thru a flexible cable. Camera spring motor drives recorder in absolute "sync". Record-play amplifier is fully transistorized with self-contained cadmium-nickel rechargeable batteries ... no other power source is required.

Remote hand mixer permits control of recording levels by thumb movement... giving operator a "feel" for position while concentrating on eye-piece. Mixer contains VU meter, record and playback controls, film-direct monitor switch, battery test switch, microphone input and earphone output jack. Mixer may be clipped to cemera, tripod, belt or pocket during takes.



7 lb. recorder/reproducer

The amazing Nomad makes any movie camera a sound camera, any projector a sound projector in professional "lip-sync"



C

A. Nomad film is split 16mm. Channel #1 on the twin-track record head is used for lip-sync and narrative recording on location. Later, complimentary music from phonograph or tape recorder is "dubbed" on channel #2. Simultaneous playback thru the full width play head mixes music and voice, producing theatre-quality sound.

B. For lengthy sequences, a regular camera D.C. motor can be attached to the Nomad, driving both recorder and camera thru the flexible cable. There is a 180 rpm output in the Nomad camera interlock and a 1440 rpm output for projector interlock. Playback can be double-system, or a 1:1 interlocked transfer from recorder to a striped release print can be made with a magnetic sound projector.

C. Basic film capacity is 100 ft.; the use of simple adapters can increase capacity to 400 ft. or 1200 ft. Entire Nomad system fits compactly into small carrying case.

Editing is easy with an inexpensive synchronizer and a sound reader. Since each roll of Nomad film is exactly the same length as the picture film, points of reference for editing are easily provided.

price $585

Basic Nomad system consists of recorder-reproducer, remote hand mixer and camera mount. Other accessories are available.

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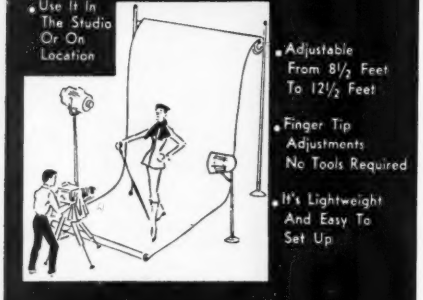
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Industrial Roundtable

by MORRIS GORDON, Western Electric

Meet You in Miami?

The time of the 4th Annual Photojournalism Conference, co-sponsored by the American Society of Magazine Photographers and the University of Miami, is quickly approaching. It will take place at the Lowe Museum on the campus of the University of Miami, Coral Gables, Fla., April 27-30.

The conference is a dedicated affair, and I am proud of the fact that together with Wilson Hicks, former executive editor of Life and now lecturer in journalism at the university, I serve as co-chairman of the event.

Morris Gordon

More honors have been bestowed on Morris Gordon (Morrie to his legion of friends). He is the subject of a pictorial essay in the April issue of U. S. Camera.

This is one of the most inspiring and exciting affairs in the world of photojournalism. *In today's assembly-line world, photographers are among the few true craftsmen in the world, creating with their hands, brain and eye a complete thing.* The conference dwells on this phenomena, not exactly overlooking the tool, which is the camera, but concentrating more on method and approach. In other words, the mental approach.

The use of photojournalism is not confined to the top newstand magazines. Quite the contrary. Its use has spread to the advertising, commercial and industrial fields. The good industrial publications use the same top photojournalists that Life, Look and other slick publications employ. To shield themselves from this approach is the worst thing that could possibly happen to photographers.

Recently I went to Holland to photograph the top brass in one of the biggest corporations there. They wanted a set of pictures done in the same informal manner in which I have been successfully photographing Bell System people. Although the pictures were made early last fall, I still receive letters of praise from my clients. These photographs were made with a 2¼x2¼ camera, using the photojournalistic technique of available light. I permitted the photographers employed by that company to watch me, and they tell me that they have changed their entire method of operation. This may or may not be wise since in my organization, we employ all techniques available to us, and when we learn of a new one, then, by golly, we go out and learn it because we are never sure when it may come in useful.

It is wise for industrial as well as other photographers to have many techniques at their beck and call. Our work is exciting because it is always challenging, never the same. I have said over and over again that there are no routine assignments, just routine photographers who know only one way to solve problems. To these photographers I say "Come to the Miami Conference."

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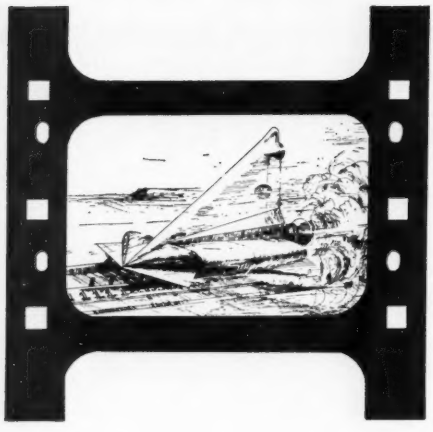

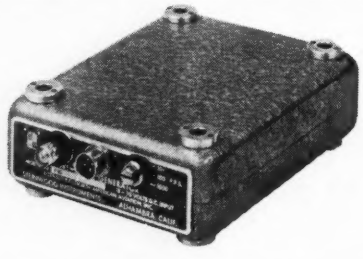

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The Steinwood Tri-Pulse Generator

A common time base for many stations

The Steinwood Tri-Pulse Generator provides for precise comparison of simultaneously recorded action. A preselected frequency of 10, 100 or 1,000 pulses per second can be recorded on the film of up to 10 cameras, enabling the data reduction man to correlate information from a known time standard.

COMPACT — Less than 1.5 pounds.

RELIABLE — Performs within 1% of selected frequency.

PORTABLE — A miniature 30 volt battery for power source.

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SELECTIVE — 10, 100 or 1,000 pulses per second.

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PERFORMANCE — Successfully used under the severe environmental conditions of field operations. Proven reliability on sled runs exceeding 40 G's.

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PHOTOGRAPHIC

Science and Instrumentation

High Precision Film Readers

by EARL G. RAGUSE

Benson-Lehner Corp.

A semiautomatic, high precision film reader is a complete system for analyzing and measuring photographic information and reducing it to a form compatible for recording on a medium suitable for human or computer interpretation. "Semiautomatic" means that after inserting the film record and setting up the machine, the operator enters the process only to render decisions on photo-interpretation, to establish measuring system coincidence with the object to be measured, and to issue control commands by means of hand wheels and push buttons. The term "high precision" means an accuracy of 10 microns or better, compared to conventional film readers with accuracies in the order of 10 to 20 microns.

Most likely the probable beginning of semiautomatic film readers was in conjunction with astronomical photographs and the early designs were very specialized and made by the user. It was the advent of photo-instrumentation in aerial gunnery, photo mapping and flight instrumentation that began to produce data in such quantities that it was necessary to develop means of automating the data reduction process.

There seem to have been two parallel paths in the development of film readers: (1) automation of high precision lead-screw type optical comparators for starplates and precision photo mapping; and (2) development of relatively low accuracy, high volume, general purpose film readers for reducing the mass of data resulting from aircraft missile and gunnery testing. Early film readers usually had an analog circuit for scaling the output into meaningful values before converting to digital form on punched cards, paper tape or typed lists. However, the growing use of general purpose digital computers has caused a trend to direct digital encoding of measurements.

Today, the trend in film reader requirements is to combine high accuracy and high production in one machine. This is due to a general improvement in photographic instrumentation cameras, photographic emulsions and the widespread use of digital computers. Scaling has become relatively unimportant since calibration and scaling can be easily accomplished in the digital computer.

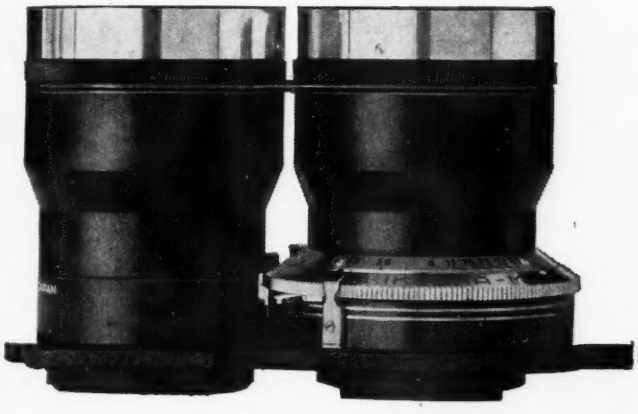
Two basic measuring systems are considered important presently in the design of film readers: (1) measurement on an amplified image of the film and establishing reading reference coincidence with the measured object in the plane of the magnified image by the unaided eye; (2) making measurements in the plane of the film using the am-

continued on page 63

Current Manufacturers of Semiautomatic Film Readers

The following list of manufacturers was compiled by the author through questionnaires sent to the heads of large data reduction laboratories.

Benson-Lehner Corp.	Los Angeles, Calif.
Coleman Engineering Corp.	Culver City, Calif.
Telecomputing Corp.	N. Hollywood, Calif.
Bell and Howell Co.	Chicago, Illinois
Sherman Fairchild and Associates	Yonkers, New York
Helgar and Watts	London, England
Nuclear Research Instruments, Inc.	San Francisco, Calif.
Wild Heerbrugg Ltd.	Switzerland
Gilliland Instrument Co.	Oakland, Calif.
Opto-Mechanisms, Inc.,	Mineola, New York
Ottico Mechanica Italiana	Rome, Italy
Zeiss-Aerotopograph	Munich, Germany



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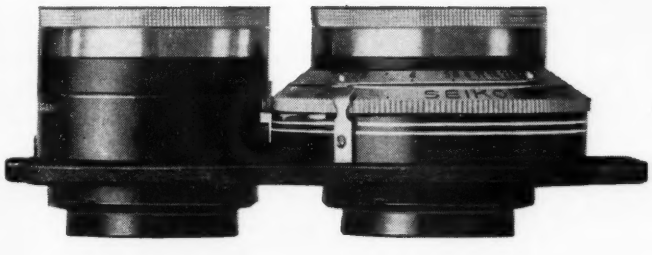

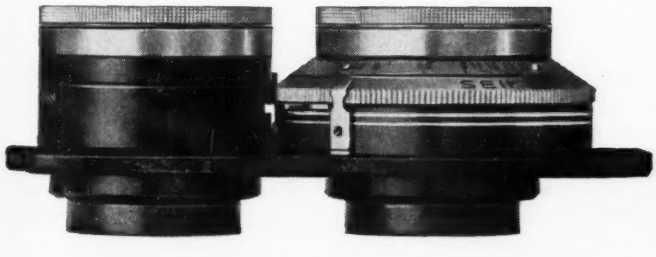

MAMIYA C2—one camera for every picture need from 7 inch close-ups to long-range telephoto

Mamiya C2 twin-lens reflex with interchangeable 80mm f2.8 lens set (focuses to 7") $169.50. Interchangeable Lens Sets in Leather Cases: 105mm f3.5 (to 16") $93; 135mm f4.5 (to 24½") $103; 180mm f4.5 (to 36") $139.50. All lens sets in M-X synchro-flash shutters; speeds: 1 sec. to 1/400th.

At your dealer or write Dept. IP-4, MAMIYA • a division of Caprod Ltd., 111 Fifth Avenue, N. Y. 3

In Canada: Precision Cameras of Canada, Ltd., 5385 Pare St., Montreal 9, P. Q.

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Make enlargements of "contact print" quality. Ethol UFG is used by thousands of photographers who seek the finest.

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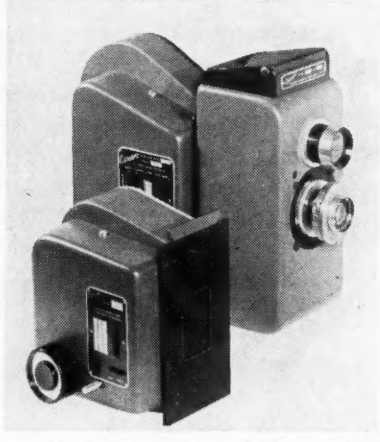
Circle No. 598 on Post Card

Bert Lefkowitz views the New Products

An easy way to keep posted. Each item featured below has a key number. For more information — without obligation — circle same number on Readers Inquiry Card (pages 81-82).

Camera System 101

A complete line of long roll film cameras, magazines and accessories has been announced by *Photo Control Corp.* The Model 10 Camera is a positive locked, fixed focus



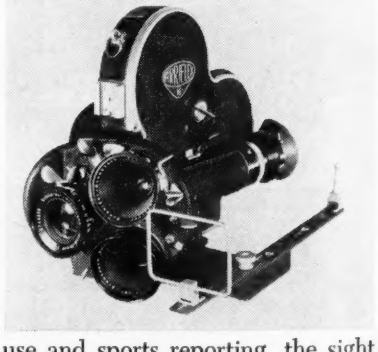
model covering the field from 40″ to infinity, and is available with 103mm and 127mm lenses in heavy duty shutter. The Model 20 features rapid focusing, automatic parallax correction and 127mm, 162mm and 190mm lenses. Reflex or eye level viewing as well as a ground glass panel are available for both models. Camerz magazines for perforated or unperforated 35 mm, 46mm, 52mm and 70mm films in lengths up to 200′ may be obtained and will fit certain other professional cameras with or without adapters. All size and length magazines come either manual or in electro-automatic models. Constructed of lightweight aluminum, typical applications for the Camerz units are in ID work, instrument reading, and microfilming.

Electronic Flash for Framing Cameras 102

A compact, portable electronic flash unit designed to provide a brilliant source of illumination for high speed framing cameras has been introduced by *Beckman & Whitley.* The Model 357 Electronic Flash Unit has a capacity of 1200 watt seconds and delivers a single flash whose duration is controllable to correspond with the writing rate of the camera. Duration settings range from 8.70 to 22.25 milliseconds and provisions are included for various methods of triggering. An additional feature of the equipment is a modeling light which pulses at 60 flashes per second for use in framing, focusing and lighting arrangements.

Target Finder 103

A dual purpose open frame tracking finder for Arriflex cameras has been announced by *Birns & Sawyer Cine Equipment Co.* Designed primarily for chase plane

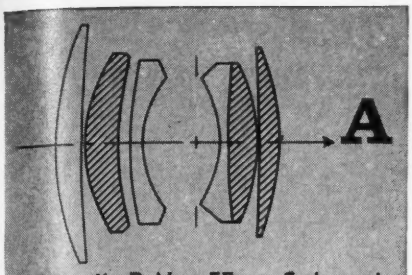


use and sports reporting, the sight is adjustable for both 25mm and 50mm lenses and is exactly parallel to the top and bottom film frame lines. Both front frame outline and rear target sight collapse on a spring loaded mount when not in use. Price: $49.50.

Ultra High Speed Camera 104

An important new addition in the field of high speed photography is the *Benson-Lehner* Ellis Ultra

continued on page 73



Automatic Rokkor 55mm 6-element, f:2, rare earth, platinum pot lens

A great new Rokkor lens...

A great new Minolta camera

Fully automatic diaphragm • Instant return mirror
Ultra bright viewing • Complete system of photography

Here's a new f:2 lens in the famous Rokkor tradition...with corner to corner sharpness. Here's Minolta-precision in every important feature serious photography demands. Fully automatic diaphragm with lock-in half-stops, instant return mirror, double-bright fresnel viewing system, hushed focal plane shutter with 12 click-in speeds from B to 1/500th, magnified counter, automatic zero return, built-in bypass on the self-timer, rapid rewind, separate FP and X terminals, flick-in bayonet lens mount.

And for every professional application, there's a Minolta lens or accessory to do the job...a complete system of photography.

A professional camera like this at $179.50 is possible only because Minolta makes the rare earth, platinum pot lenses from beginning to end. They design them, actually make their own glass, grind, polish, coat, mount, and assemble them. That's why Minolta is seldom matched in quality...never matched in price!

Minolta SR-1

$179.50

For the professional who won't spend $250 or more for an automatic single lens reflex.

Your choice of 9 lenses

Standard: Auto Rokkor 55 mm, f:2, with camera; **Wide Angle:** Auto Rokkor 35 mm, f:2.8, $119.50; **Telephoto:** Rokkor 100 mm, f:4, $59.50; Auto Rokkor 100 mm, f:3.5, $99.50; Rokkor 135 mm, f:4, $69.50; Auto Rokkor 135 mm, f:2.8, $139.50; Rokkor 200 mm, f:3.5, $179.50; Rokkor 250 mm, f:4, $215; Rokkor 600 mm, f:5.6, $550.

All these precision accessories

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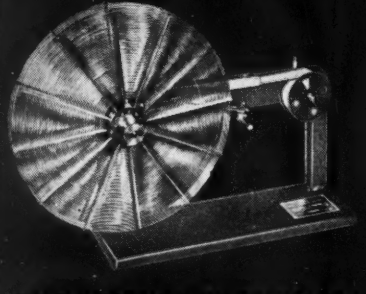

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Technical Trends

by GEORGE ASHTON

Pros and Cons of Thermoplastic Recording

Thermoplastic recording, one of the most interesting methods of recording and storing information yet to appear, was demonstrated in public for the first time by General Electric on January 12 in New York. This system has already been described in INDUSTRIAL PHOTOGRAPHY (February 1960, p. 55) and was the subject of a paper by the inventor, Dr. William E. Glenn, in the *Journal of Applied Physics* (December 1959, p.1870). Speaking at the press conference, Dr. Guy Suits, vice-president and director of research of General Electric, pointed out that it is no simple matter to evaluate the full potential of new complex technical systems of any kind and emphasized that thermoplastic recording has been but recently developed and employs basically new principles. Much additional technical development must be done before thermoplastic recording appears in commercial products.

In spite of the understandable reluctance on the part of those responsible for the invention of the process to discuss in great detail the possible future applications, it is clearly one of considerable potential importance. Thermoplastic recording combines the processing speed and versatility of magnetic recording with the enormous storage capacity of photography, and thus offers the advantages of both these recording systems without some of the disadvantages. In order to record pictures on magnetic tape, for example, either very high tape speeds or complex rotating head assemblies which provide both horizontal and vertical sweep are required. Thus, putting enough information on the tape to provide a good quality picture is a mechanical problem in which the limits are set by the attainable smallness of the gap in the record and reproducing head.

Photographic recording methods, however, are capable of providing excellent picture quality within mechanical limits reasonably simple to achieve. But photographic recording needs chemical processing, and the film cannot be erased and re-used. Recent developments in photographic processing have brought the time involved in this stage of the process down to a matter of seconds.

Electrons Focus on Surface

Thermoplastic recording overcomes the difficulty inherent in magnetic recording due to the finite width of the gap in the recording head by using a beam of electrons focused on the surface of the recording material. The recording medium is high melting point film base coated with a transparent conducting coating with a thin film of a low melting point thermoplastic on its surface. The electron beam lays down a charge pattern on the surface of the thermoplastic film and the beam, and hence the charge pattern, is modulated in accordance with the information it is desired to record. After the charges have been laid down, the plastic is temporarily softened by heat which enables the electrostatic forces created by the charges to deform or wrinkle the melted plastic, which is then immediately allowed to harden. This freezes the wrinkles which carry the information and in less than .01 seconds forms a record.

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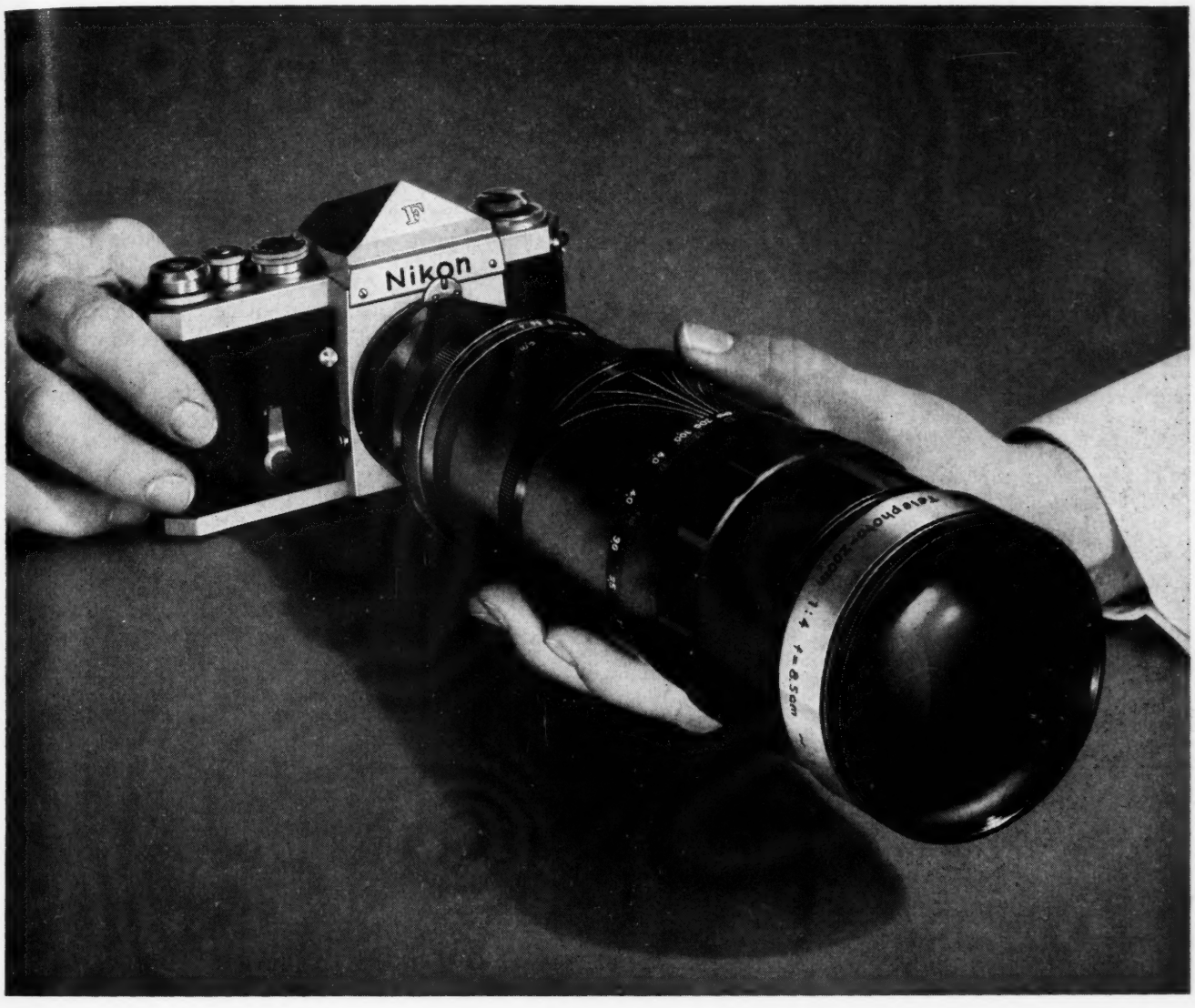

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The new Auto-Nikkor Telephoto Zoom is internally coupled to the automatic diaphragm system of the Nikon F. Always at full aperture for focusing, viewing and focal-length selection, the lens automatically stops down to the 'taking' aperture —and then, instantly, reopens to f/4. There is no black-out; no dimming of the finder image.

The Auto-Nikkor Telephoto Zoom is an outstanding technical achievement—an achievement that speaks eloquently of the caliber of skill and creative ingenuity that is being devoted to all Nikon products.

Above all, the Auto-Nikkor Telephoto Zoom is a lens of flawless quality, exhibiting the same high resolution and color correction for which Nikkor lenses have become justly famous the world over. It is truly as fine a lens as it is unusual—a lens worthy of the most critical, discriminating user of 35mm equipment. Priced at $595, it fulfills the function of many lenses, the total cost of which would be many times that sum.

See the new Auto-Nikkor Telephoto Zoom at your Franchised Nikon Dealer. For further details write to Dept. IP-4.

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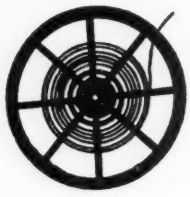

Movie Clinic

Ektachrome ER 16mm High Speed Reversal Color Film

by BRUCE JAMIESON
President
Jamieson Film Company

The recent introduction of Ektachrome ER 16mm High Speed Reversal Color Motion Picture Film has added a long awaited tool to the camera case of the motion picture photographer. The new film combines fast emulsion speeds (Daylight ASA 160 — Tungsten ASA 125) with low grain and faithful color rendition to achieve results not possible with any other emulsions.

The results of our tests of the product exceeded our expectations, and we believe it is destined to find wide use in the motion picture field.

To accommodate the new emulsions, we modified a processing machine of our own design and in late November 1959 began processing tests.

In the tests necessary to complete a full range of evaluations of the new process, a great deal of footage has been exposed by cameramen. Although the initial tests were routine exterior scenes shot merely to establish correct processing times for standard ASA ratings, subsequent tests were designed to investigate the limits to which the film could be used with commercially acceptable results. Shooting under extremely limited light conditions became a routine procedure in these tests.

Chronologically, our first tests were exterior scenes using as many varied color objects as possible, plus flesh tones to evaluate the faithfulness of the color. These scenes in sunlight, photographed at *f*/16 and 45-degree shutter, showed a natural color rendition of all objects, plus a low grain characteristic approximately equivalent to that obtained previously on Commercial Kodachrome. Latitude of the film in light and dark areas appeared much greater than any Kodachrome stocks, and there was no noticeable color shift in the shadow areas. Objects in green and yellow as well as pastel colors were accurately reproduced. The most noticeable characteristic was the strong reds obtained with this film. Red hues had a saturation equivalent to that obtained on regular Kodachrome. However, the higher contrast normally associated with the Kodachrome stocks was not present. In short, color reproduction was best described as a "natural" rendition of the scene photographed.

Following the exterior tests, interiors were photographed using the tungsten film. Again, color reproduction was faithful, contrast was low, and the grain characteristics were much less than had been anticipated. A slight magenta tint in the highlights was traced to a processing deficiency, and corrected on the next series of tests.

Since a large volume of exposed film was desired in the processing tests, scenes of every possible description were taken. Interiors, shot with only the normal lighting conditions found in the average home, showed amazing results in latitude and color rendition. Another test using daylight film inside, with illumination provided only by light from an overcast sky entering through a diffuse curtained window, was shot at *f*/2. The footage showed a pleasing skin tone and natural color rendition. Since these tests were made just prior to Christmas, close-ups of

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Industrial Photography

APRIL — SECTION I

VOLUME 9 NUMBER 4

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SHOP TALK

RE: SECTION II, A SUMMER SUGGESTION

We call your attention this month to section two of INDUSTRIAL PHOTOGRAPHY, a special supplement devoted to "Data Processing and Microfilming Systems." It is a special bonus prepared for IP readers.

Although it is still many months away, we would like to recommend the second course in "Industrial Photographic Management" to be offered at the PP of A's Winona School of Photography, August 21-27. It covers the basic problems of management, organization and control of a photographic operation and is a session that every photo department manager (and would-be manager) should attend for his company's benefit and his own. Registration is now under way for this course which is a reflection of the increased recognition that industry is giving to that new breed of executive, the photographic manager. We are proud that INDUSTRIAL PHOTOGRAPHY has had a hand in creating this recognition and want to extend our best wishes to the course. It is doing a fine job of helping to develop qualified photo executives who in turn are giving impetus to the entire field of industrial photography which is everyone's common goal. —THE EDITORS

● Conventioneers can look forward to a lively May in California. The month starts with the 87th Convention of the Society of Motion Picture and Television Engineers, May 1-7 at the Ambassador Hotel, Los Angeles. Theme of the convention is "New Techniques for Films, TV and Video Tape" and a big attraction will be the display of more than $1,000,000 worth of equipment. Immediately after is the 1960 Conference of the Society of Photographic Scientists and Engineers, May 9-13 at the Miramar Hotel, Santa Monica. Five complete days of technical sessions are scheduled.

● Societies will also have a busy month. The 10th annual convention of the Conn. PP of A is set for May 3-4 in Hartford. . . . Third annual all day New England Lithographic Workshop hits Hamden, Conn. on May 7. . . . Boston, SPSE, holds it annual banquet dinner on May 12 as do other groups around the country.

● Educational offerings on tap include: Fourth annual Photojournalism Conference cosponsored by the University of Miami and the American Society of Magazine Photographers, at Miami, April 27-30. IP's Morris Gordon is co-chairman with Wilson Hicks . . . Nineteenth Annual Kent State University short course in photojournalism will be held on the University campus (Kent, Ohio), June 14-17. . . Winona School program (sponsored by PP of A) starts June 12 and runs through August 27 (different courses have different

continued on next page

lengths and dates). Details from PP of A, 152 W. Wisconsin Avenue, Milwaukee 3, Wisc. . . Florman & Babb Animation Film Seminar at New York's Trade Show building starts June 12 and runs through June 15.

● A continuing fascination with photography has culminated in a trip around the world for two and a Rambler station wagon for John Bass, 32-year-old industrial photographer with North American Aviation, Los Angeles. John is the grand prize winner and first prize winner, color, in *U. S. Camera* magazine's annual contest. His entry, a color shot of his wife and children, won out from more than 75,000 entries. Thus, an interest in photography that started during a Navy tour of duty has paid rich dividends.

● John Hawkins, General Asbestos and Rubber Division of Raybestos - Manhattan, Inc., is also the winner of a round trip for two to Europe. He is the winner of the Beseler Slide-O-Film Uses-In-Industry Award and has come up with a new technique for "Determination of Dust Concentration by Settlement, Using Slide-O-Film." The emulsion side of a piece of Slide-O-Film is coated, placed in a collection chamber, exposed after dust has collected, and then developed in hot water. This last step removes dust and glycerine and leaves a permanent image.

● Industrial photographers have a chance to win prizes in a number of contests: Exakta's anniversary contest has been extended to June 30 and offers three grand prizes of $1,000, $500 and $250 in equipment. Details from Exakta Camera Co., 705 Bronx River Road, Bronxville, N.Y. . . .California State Fair & Exposition is looking for prints and slides for the 20th North American International Photographic Exhibit. Details from the Exposition at P. O. Box 2036, Sacramento 9, Calif. . . . Inventive photographers are urged to present their projects at the National Inventions Conference and Exhibition. Details here are from Cleveland Engineering Society, 3100 Chester Ave., Cleveland 14, Ohio . . . Weyerhauser Co. is holding a photo contest for all present or retired employees, a thought other companies might well emulate.

● Recent meetings of note: Southern California chapter, SPSE, was "exposed" to a discussion on "Photographic Image

continued on page 58

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The new Model M Hi-Pro provides a tremendous amount of light for large areas . . . has other great features. Operates from camera shutter or as a complete slave, as shown in photo at right. Convenient outlet on each unit eliminates extension cords. Ideal for studio or on location. Gray wrinkle finish. **Self-Contained**

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FLASH DURATION—Full power 1/500 second, half power 1/900 second.
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EFFECTIVE CANDLE POWER SECOND RATING—3950.
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MODELING LIGHT—50-Watt with ON-OFF switch. Covers exact flash pattern.
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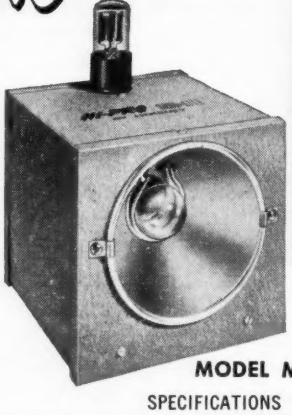
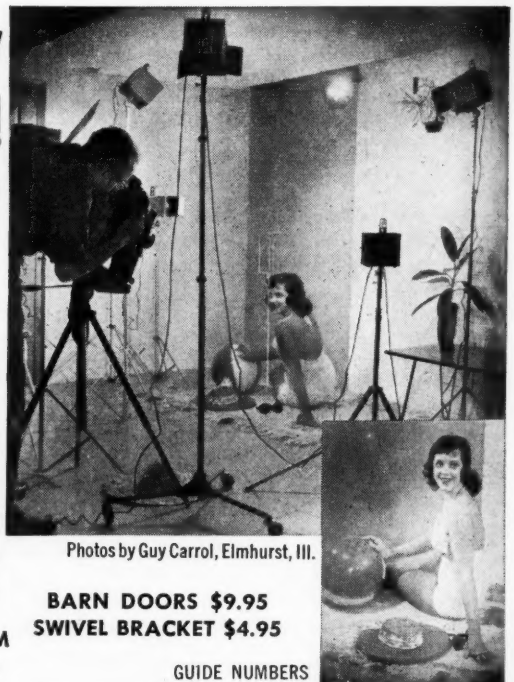


MODEL M



Photos by Guy Carrol, Elmhurst, Ill.

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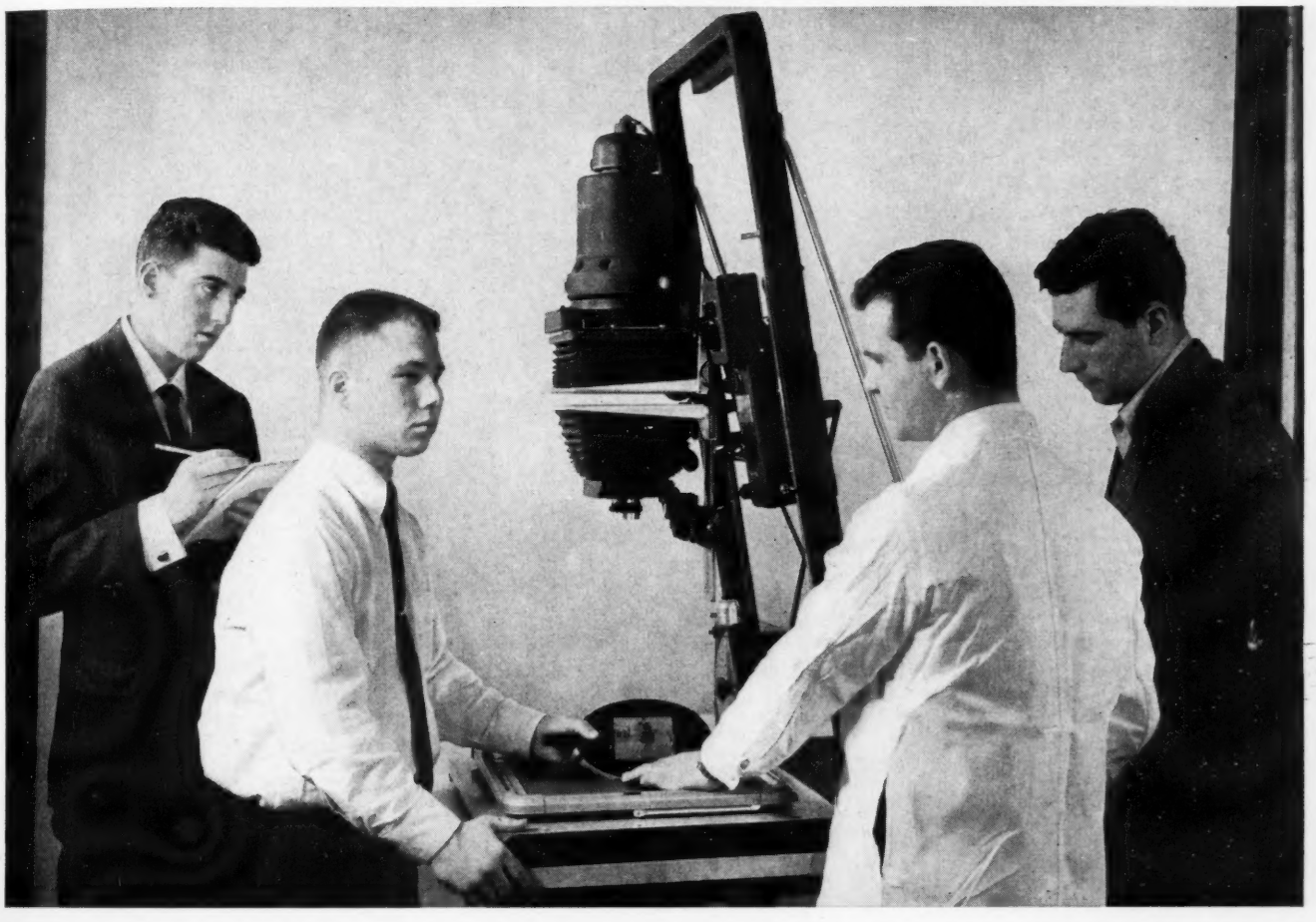

New York's World Famous Germain School of Photography offers one of the most advanced training programs in professional color photography. Teaching color printing on the highest professional level posed three basic darkroom problems for the Germain faculty.

Required:

1. A single enlarger, professional in appearance, to provide all-around utility, with special emphasis on color printing.
2. An enlarger to operate rapidly, because lengthy color processing necessitated minimum enlarging time.
3. An enlarger to operate with varying negative sizes, without the added cost and time waste normally associated with changing condensers.

The Beseler 45MCR-X proved the most practical enlarger for Germain training in every type of color printing process. Here's how it solved their darkroom problems:

1. The Beseler 45MCR-X, with its built-in color head which places the color filter material *between* the upper and lower condensers (the only place where all light rays are parallel to each other), made it a practical enlarger for every type of professional color printing, particularly Ektacolor.
2. The Beseler 45MCR-X electric motor-driven lamphouse provided fastest enlarger operation possible. Furthermore, the calibrated strip on the enlarger frame, which permitted students who had to leave the enlarger to resume work at the exact former position, contributed to speed required to keep them on schedule.
3. The Beseler 45MCR-X provided optically precise enlargements from 8mm (Minox) to 4″ x 5″ negatives without changing, storing or handling costly condensers.

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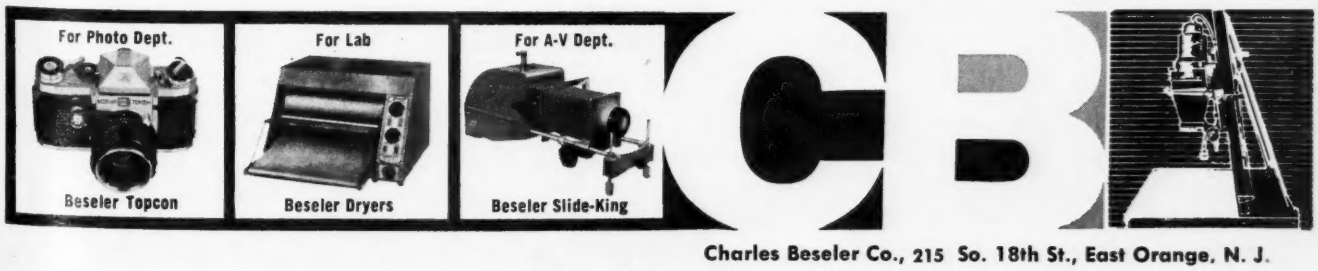

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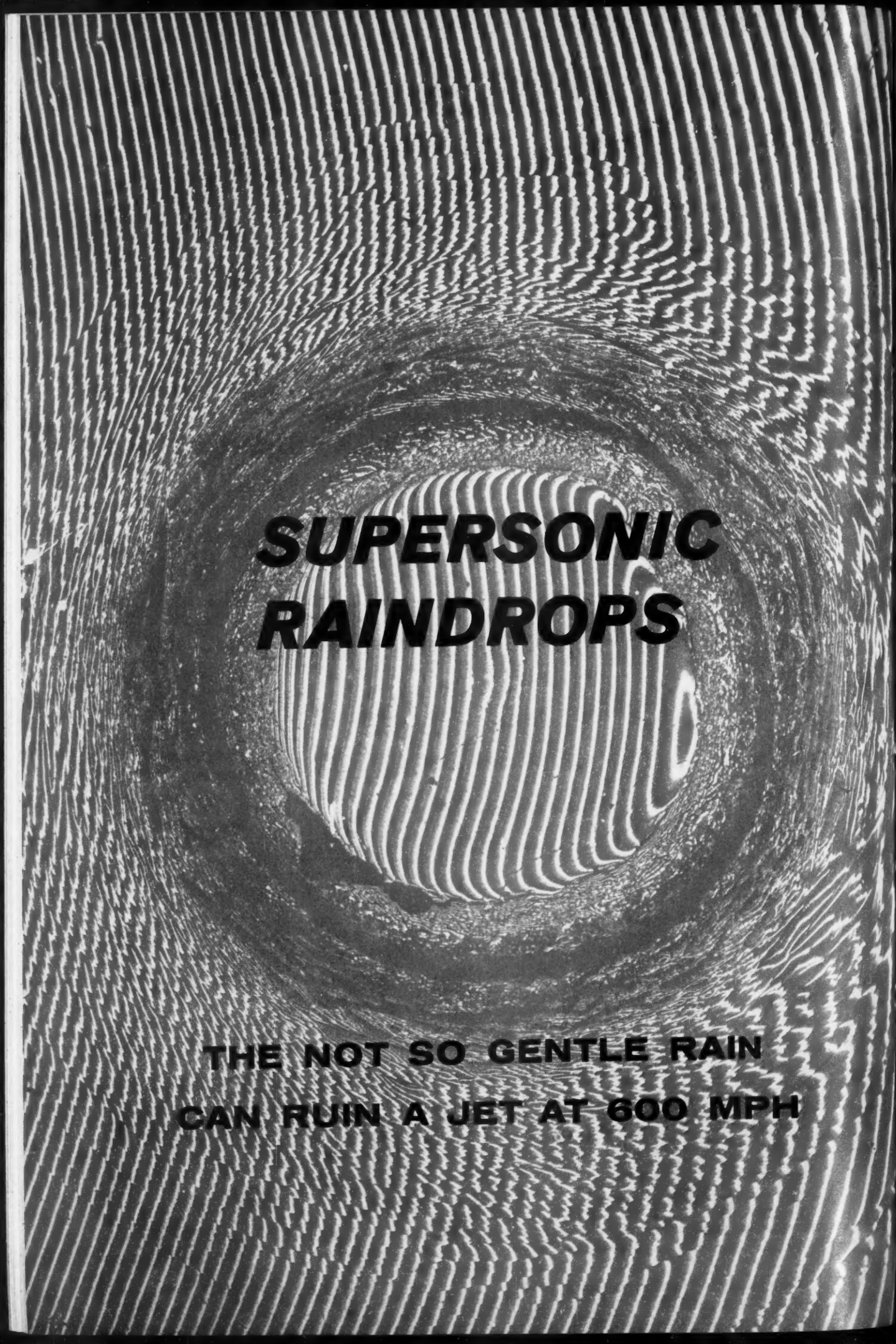
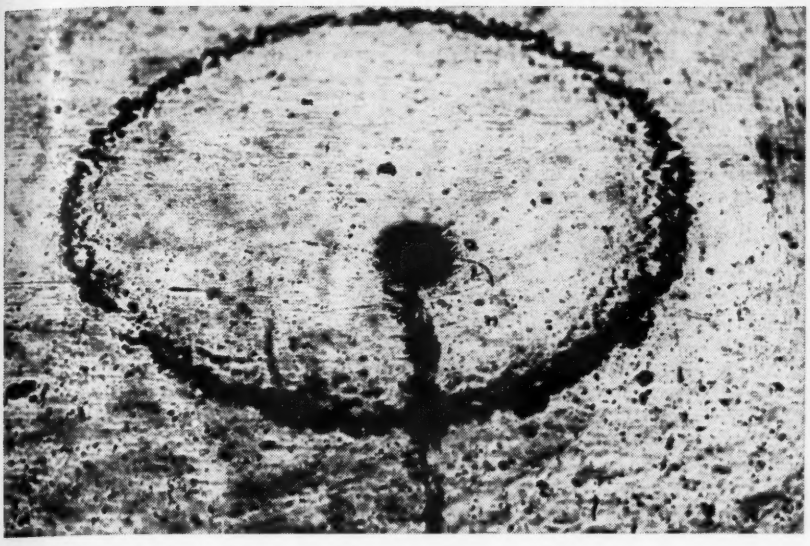

SUPERSONIC
RAINDROPS
THE NOT SO GENTLE RAIN
CAN RUIN A JET AT 600 MPH



When a gentle raindrop collides with a jet traveling at 600 mph the results can be catastrophic. The water deforms the plane's metal body and perhaps even pierces it. Microscopic craters develop from the impact of the collision.

Aviation physicists first noted the lethal effects of rain on aircraft in 1945, and the situation became intensified as the speeds of planes and missiles increased. These scientists were faced with a problem: how could they study this phenomenon which they had dubbed "rain erosion"?

Among those on the trail of a solution were Dr. F. P. Bowden, J. H. Brunton and J. E. Field of the Cavendish Laboratory at Cambridge, England. They have now devised a method of examining liquid/solid impact at very fast velocities in which high-speed photography plays a major part.

A small stainless steel injector is filled with .01 cc of liquid (the approximate volume of a raindrop) and then sealed with a neoprene disk. A slug from an air rifle breaks the disk and the highly-compressed liquid escapes through a nozzle at the far end of the injector as a short high-velocity jet. The jet stream is then projected against a stationary solid surface.

Photographs taken with a Beckman & Whitley Model 189 rotating mirror camera at less than 1/1,000,000 sec. help scientists study the liquid's behavior. Auxiliary lenses are used to produce the magnified impact area image on recording film. Light source is from the rear with a high intensity 100 micro-second flash source.

Experiments have shown that with an impact velocity of 110 mph and a given drop size it requires about 100,000 impacts to produce measurable erosion of a metal surface. If this force is increased to 700 mph the same damage will be produced by a single impact.

Three ways that a liquid injures a solid are as follows: (1) deforming the impact region because of stresses set up during the collision,

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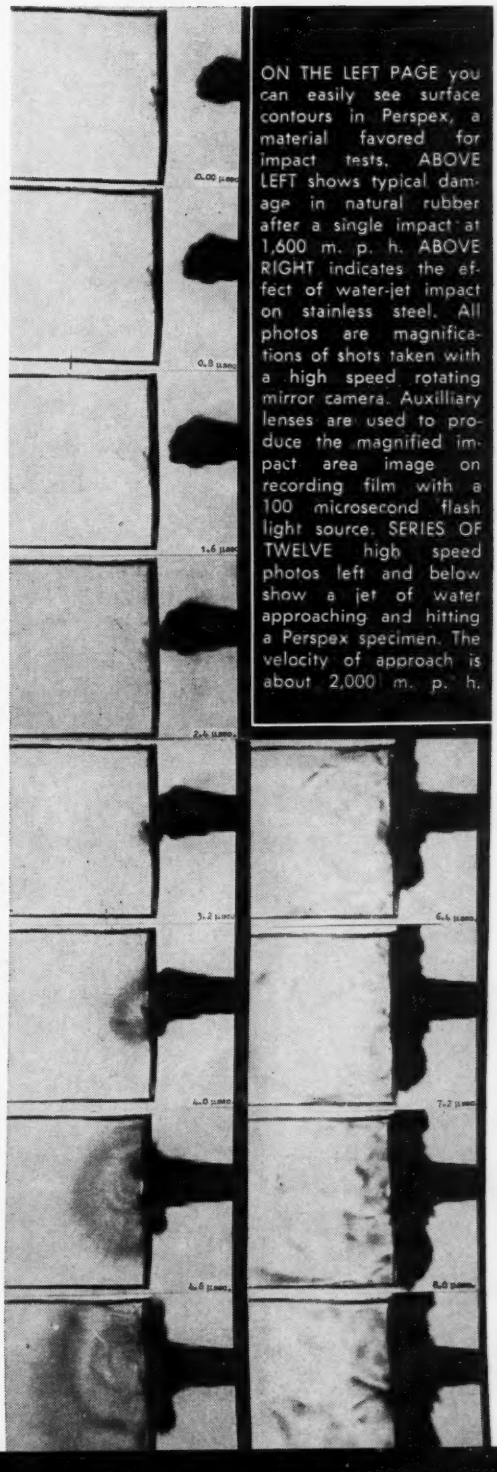


ON THE LEFT PAGE you can easily see surface contours in Perspex, a material favored for impact tests. ABOVE LEFT shows typical damage in natural rubber after a single impact at 1,600 m. p. h. ABOVE RIGHT indicates the effect of water-jet impact on stainless steel. All photos are magnifications of shots taken with a high speed rotating mirror camera. Auxilliary lenses are used to produce the magnified impact area image on recording film with a 100 microsecond flash light source. SERIES OF TWELVE high speed photos left and below show a jet of water approaching and hitting a Perspex specimen. The velocity of approach is about 2,000 m. p. h.

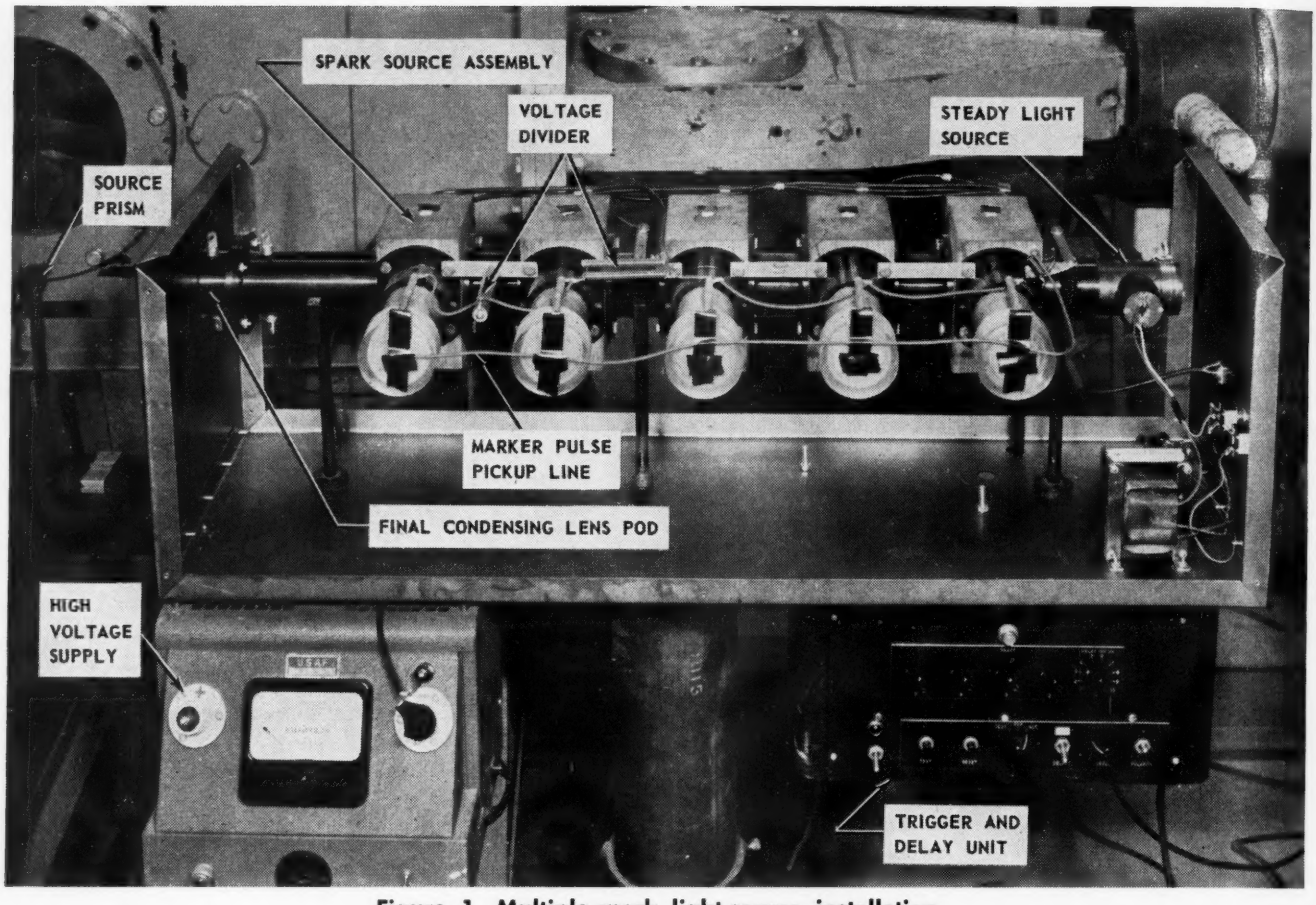
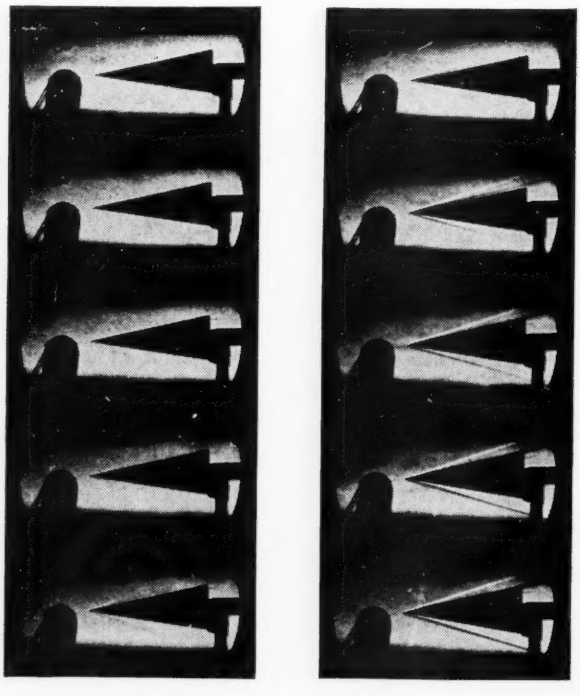


Figure 1. Multiple-spark light-source installation

HIGH-SPEED LIGHT SOURCES



SEQUENCES at right are Schlieren (shadowgraph) pictures taken of air flowing from shock tubes over a slender cone placed in the stream.

by MERLE R. WILSON and RICHARD J. HIEMENZ
Cornell Aeronautical Laboratory

Today high-speed photographic advances provide one of the most important keys to effective, inexpensive research. One such advance is the multiple-speed light source, a technique which makes possible direct photographs of such high-speed phenomena as ballistics, vibrations, or other bodies in motion within a confined space.

For example, at Cornell Aeronautical Laboratory we conduct extensive photographic research in hypersonic shock tunnels. These call for Schlieren (shadowgraph) pictures taken at several preset time intervals during a single test run which may last for as little as four milliseconds.

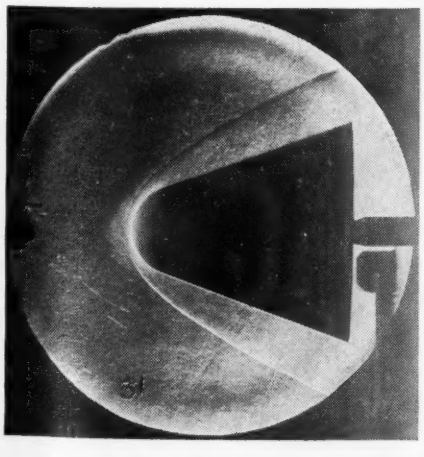
Numerous commercial systems and instruments exist to photograph such phenomena but because economy is a prime consideration at CAL we have come up with our own system that combines excellent results with low costs.

Basically, the CAL multiple-spark light source consists of five capacitors mounted in series and separated by lens assemblies (Fig. 1). Light is provided when the capacitors, set to discharge at different times, are triggered by a pressure pulse. This discharge across a spark gap aligned with the lens assembly focuses light on a right-angle prism which illuminates the subject, permitting the film on a drum camera to become exposed.

The spark-source assembly has been constructed in order to allow adequate movement for lining up the gap in the center of the lens system. This design keeps the unit from turning and keeps the spark gap perpendicular to the lens system axis. Lens focus can be adjusted within the lens pods.

Although CAL's system requires only five spark source assemblies, there is no mechanical limitation on the number of sources than can be used. A 10,000-volt source powers the spark system. Trigger pulses are provided at preset time-delays.

SHOCK WAVE passes over blunt body.



A steady light source is used for initial focusing and sensitivity adjustment.

The spark source takes advantage of a very short light flash produced by discharging a capacitor through a spark gap. In this light source, barium titanate capacitors are charged to slightly less than the breakdown voltage of the spark gaps (8500 volts).

A small photo-flash trigger coil applies a pulse of several thousand volts to a trigger electrode concentrically located in a small hole drilled through the outside electrode to break down the gap to the inner electrode at the desired time.

Independently adjustable time-delays are provided for each spark. A delay of 100 to 2000 microseconds for the first spark allows flexibility of location for the trigger station. The remaining four delays, continuously variable from 50 to 500 microseconds each, cover the necessary range of camera drum speeds and testing times. Other ranges can be made available. Consecutive triggering allows the time interval between individual flashes to be independently controlled.

Five Separate Spark Lights

The optical system of the CAL setup consists of five individual spark lights mounted in line with a lens system that is designed to focus the spark from the end electrode onto each preceding electrode, and finally on a common right-angled prism, where it is sent through the Schlieren system. Each of the other four sparks is similarly focused on the preceding electrode so that all five come to focus at the same point on the common source prism. It is important that the spark gaps be aligned along the axis of the condensing lens system to eliminate distortion.

This multiple-spark system is used at CAL with a 14-inch

continued on page 61

Figure 2

RECORDING THE UNSEEN

Biological photographers are the "eyes" of research teams developing tomorrow's life-saving vaccines.

by DOUGLAS F. LAWSON

The Beecham Research Laboratories Ltd. Banstead, England

Within the last eight years a new field of study of immunological reactions has been developed. (EDITORS' NOTE: According to Webster, "immunology" is the medical, bacteriological and chemical science treating the phenomena and causes of immunity.) It is the study of the precipitation characteristics of antigens and antibodies. Characteristic of this method is the formation of white bands, of varying width and intensity, in a flat, thin agar gel. The bands are composed of antigen-antibody precipitates laid down where the two components, which diffuse toward each other from wells or cups, cut in the gel, meet in optimum proportion.

For the purpose of a permanent record of the scientific information contained on a gel plate, it is essential that a true reproduction of the band patterns be obtained. Free-hand drawings of the patterns are not entirely satisfactory. They are tedious to carry out and subject to observational error and unconscious psychological bias. Unconsciously the eye can see what does not exist and overlook what does.

The camera, therefore, is the best available tool for recording the bands. At this laboratory we have developed a satisfactory and practical method for making these photographic records. It was arrived at through the following detailed experiments:

Experimental Procedure I

A petri dish was placed on a piece of contrasty bromide paper directly beneath the enlarger lens and illuminated by the enlarger light. The main difficulty was to record the finer bands or lines. Many bands often appeared on one plate, some running closely together and at times being superimposed one on another, which made the task of photographing more difficult. The direct contact print of the precipitation bands was life size and had to be re-copied if further copies or slides were required. Here again some detail was lost. Substances such as minute dust specks, which settle on the surface of the gel, were clearly reproduced and became confusing. These specks appeared as fine white dots and lines, due to their acting as "stops" to the vertical illumination. Foreign marks could have been spotted out but if this had been done, the record produced would have ceased to be of scientific value. The use of petri dishes with uneven glass marks also caused additional lines to be reproduced on the photographic image, again making interpretation of the bands more difficult.

Experimental Procedure II

Precipitation bands were then photographed at an oblique angle, but the results were unsatisfactory, because at such an

continued on page 59

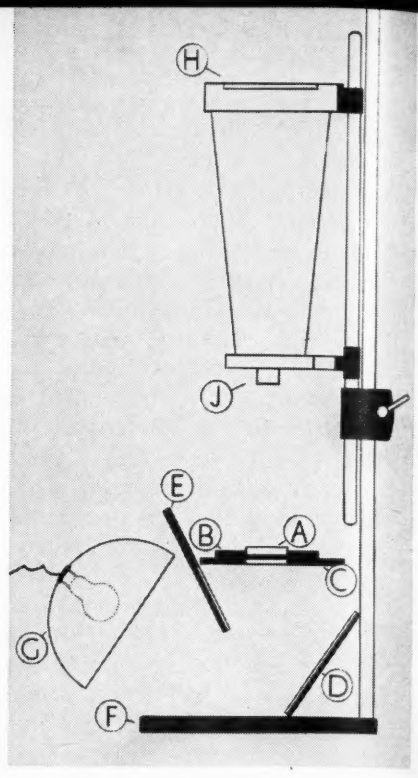
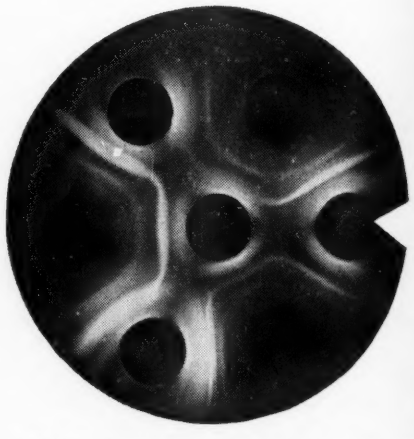
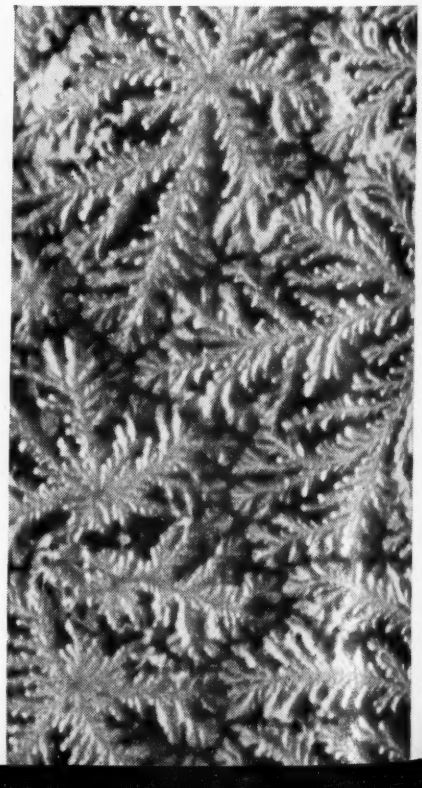


Figure 1



ABOVE: Precipitation bands photographed without having been covered with water. BELOW: Another biological record.

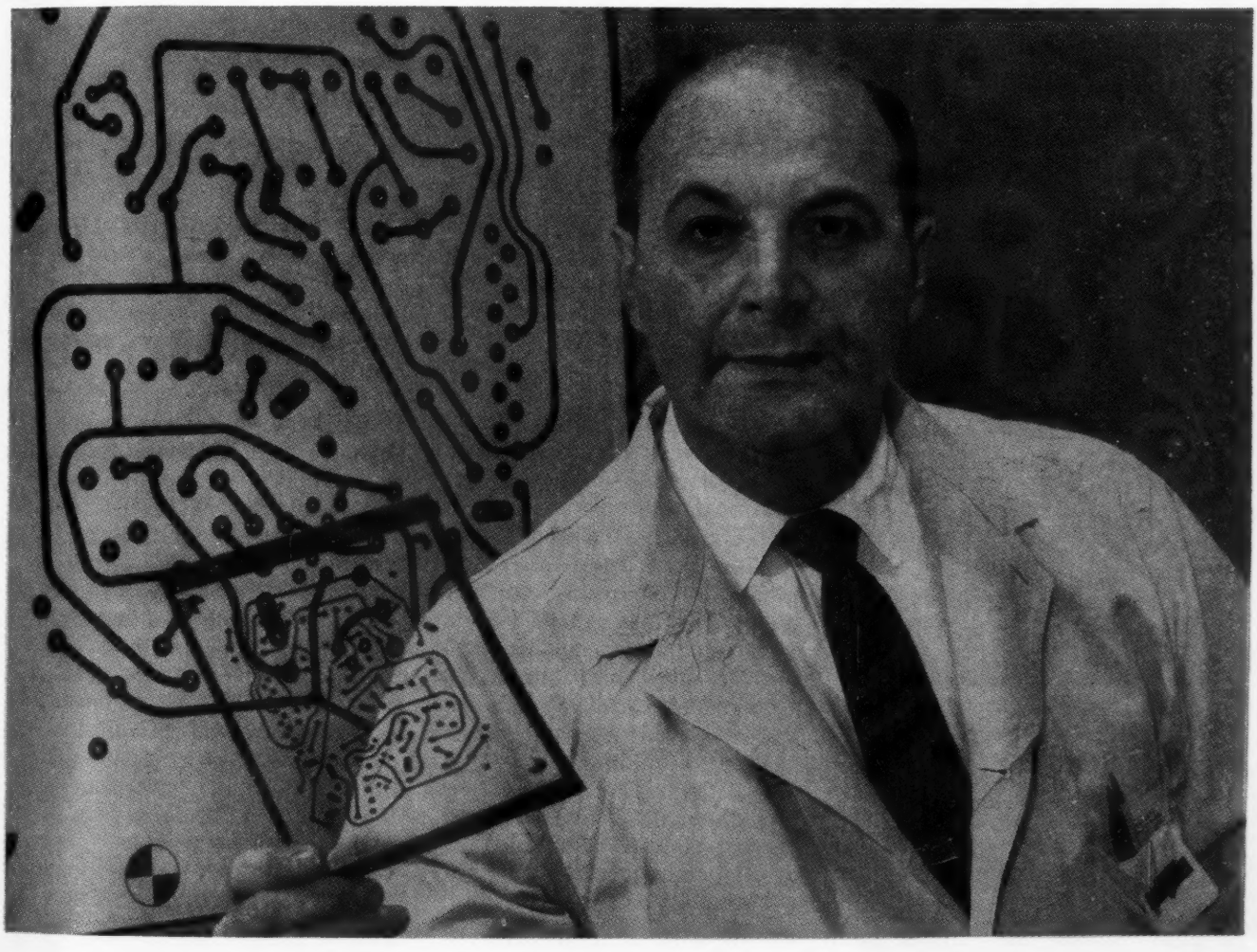


"Without the effective stability of CRONAR® Ortho A, we would be faced with an almost impossible task in making printed circuits"

— Mr. Paul Kramer, Supervisor of Photography, Precision Circuits, Inc., Mount Vernon, N. Y.

Precision Circuits, Inc., ranks as one of the nation's leading makers of printed circuits. Mr. Kramer says, "Film is our critical medium. We must work with a film that fulfills the most stringent requirements: it must meet critical optical standards; must remain stable where temperatures are variable; and it must stand up under punishment in the course of processing, handling and storage. The fact that we use CRONAR Ortho A Litho Film exclusively is a tribute to this excellent product."

Another important advantage of CRONAR Ortho A: it dries quickly because its polyester base absorbs virtually no moisture. Mr. Kramer states, "If necessary, we can dry CRONAR negatives in five minutes without any residual shrinkage."



Mr. Paul Kramer holds negative on CRONAR Ortho A. In background is the master artwork. At Precision Circuits, reductions or enlargements on CRONAR must hold to a tolerance of two-thousandths of an inch.

CRONAR Films are outperforming other films in shops all over the country. There's probably an operation in your shop that can be made more efficient by one of these dependable films. For more information, or a demonstration in your own plant, contact your Du Pont Technical Representative, or write: E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, Toronto.

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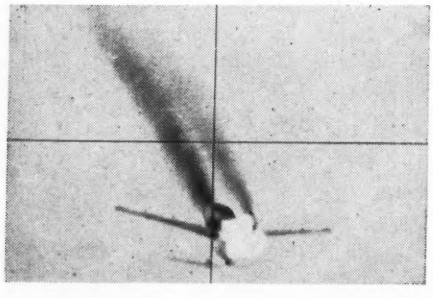
This advertisement was prepared exclusively by Phototypography

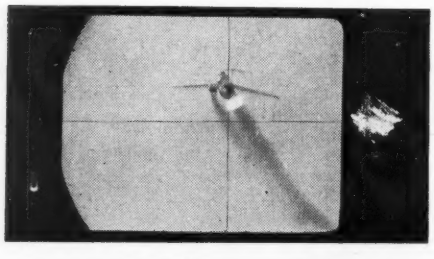
Circle No. 531 on Post Card

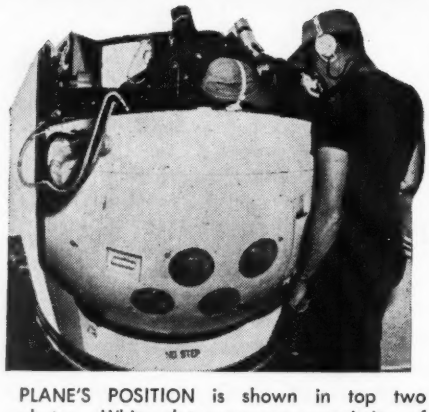
SIX-JET B-47 target plane makes a low pass over the desert to orient the Ryan tracking site before tracking run.

TRAINED TO TRACK

An unpromising war surplus machine-gun ball provided raw material for a smooth-working tracker at Ryan.







PLANE'S POSITION is shown in top two photos. White dot represents proximity of seeker system to the target plane. At bottom men prepare for run.

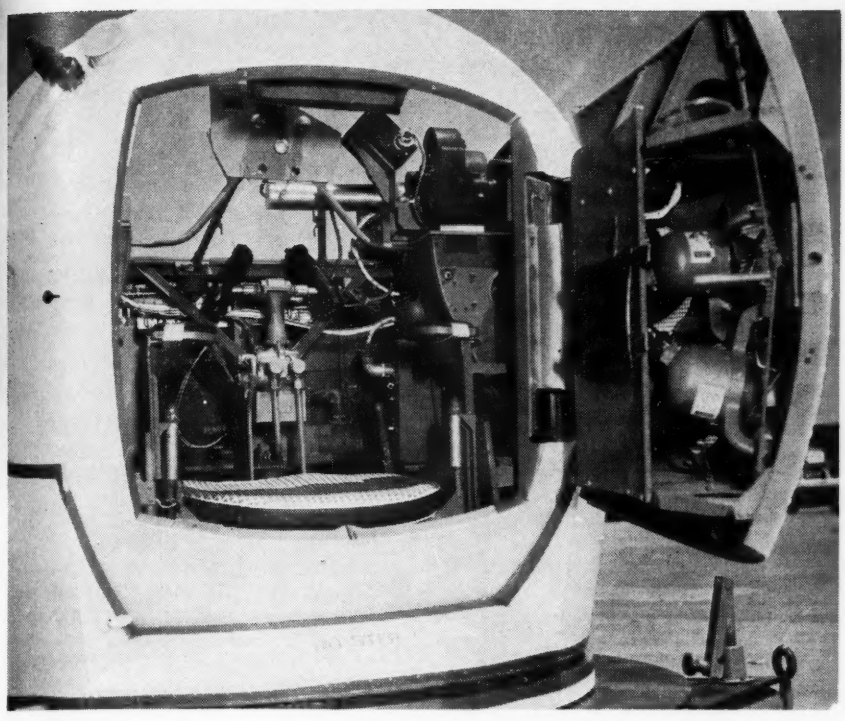
The electronic seeker system is the missile's eyes, ears and brain. This mechanism in the missile permits it to detect the target plane, relentlessly track it through evasive maneuvers, and finally destroy it when the lethal range is closed. Recently, engineers at Ryan Aeronautical Company wanted to measure the performance of these electronic seeker systems which Ryan builds. They devised an inexpensive photographic tracking device and then installed it in a war surplus machine-gun ball turret. With it they were able to simulate successfully the problems involved when a missile "homes" on an enemy plane. Although the ball turrets have now been dismantled, they served their purpose well and Ryan is proud to tell their story.

The engineers knew that a fast, accurately-controlled tracking system was required since airplane speeds are high and tracking angles are wide. The obvious solution was a hand-actuated (for azimuth and elevation) tracking stand and platform built of tubular steel. It would have to be strong to support the weight of guidance equipment, camera, telescopes, electronic gear and a human operator. It also had to be easy to swivel into tracking position by means of hand cranks. Further, man and equipment would have to function with a high degree of efficiency and accuracy under desert environmental conditions of high winds and withering temperatures.

Purchase Machine-Gun Ball

An electronics field test engineer was thumbing through a dog-eared catalog of war surplus equipment one day when a photograph of a Naval aircraft machine-gun ball turret caught his eye. With a little reworking — providing that the turret was in fair condition to start with — why wouldn't one of these do the trick? After all, it was designed for the purpose of tracking aircraft.

Engineers were soon clambering through a small mountain of surplus turrets at a Los Angeles supply outlet. In all, they inspected and rejected more than 75 before they found the turret



RYAN TURRET from a reclaimed World War II machine-gun ball houses tracking camera, telescope and seeker. Note fans on the door to counteract fierce desert temperatures.

they were hoping to find. New at the time it was placed in storage, it had never been installed in an aircraft and had escaped the damage of demilitarization. Further inspection showed the electrical and hydraulic equipment, as well as the motor, to be in near perfect condition. Its price — $300.

Turret Stripped

Once the turret arrived at the Ryan plant in San Diego, it was summarily stripped of all its military and aircraft trappings. With ammunition boxes, armor plate, gun mounts and intercom system gone, little remained but the basic shell, which two men could lift quite easily.

Next came the job of reworking the turret for the new function it was to perform. One of the first steps was to convert the turret's hydraulic supply from a variable displacement, continuous operation system to a cycling type with a large pressure differential and accumulator storage. This was done to eliminate the noisy operation of the pressure pump as the operator maneuvers the turret through each tracking run.

In front of the operator, just above his hand controls, a quarter-inch aluminum plate deck was installed to serve as an equipment shelf. Above the deck were mounted the operator's tracking telescope and a Bell & Howell 35mm Eyemo camera with a 3-lens turret installed in the machine-gun ball. One of the lenses on the camera was an Eastman Kodak telescopic lens modified with cross hairs. The film used was Tri-X in 400 ft. rolls. Provisions were also made for mounting the guidance equipment in this general area. An electronics junction box was installed beneath the deck to handle the flow of data and information into and out of the turret.

The intense heat of the desert environment in which the tracker was to operate posed special problems of protection for both operator and equipment. To minimize the absorption of solar heat, the entire ball structure was painted white as well as its plastic dome, which served as a sunshade. Four six-inch fans delivering 1,000 cubic feet of air per minute were installed in the door. As a result, the inside of the turret was kept at the ambient temperature—90 to 108 degrees on an average summer day in the desert area where the tests were conducted.

Here's how the tracking device worked:

The operator's tracking scope, the tracking camera and the seeker itself were boresighted in parallel with each other. Like railroad tracks, their lines of sight never actually converged on one point; instead, they retained the same distance relationship to each other that they had in their mounts on the turret.

Unlike the fixed "eyes" of the scope and camera which were aimed by movements of the turret, the "eye" of the seeker was free to move about and locate the target on its own. In other words, the point at which the tracking scope and the camera were aimed depended upon the tracking ability of the human operator, while the point at which the seeker was aimed depended upon its own tracking ability. The ideal situation occured when all three devices pointed at the same small area in space — the engine nacelle of the target aircraft, for example.

In an actual tracking run, the turret operator picked up the target airplane in the cross hairs of his telescope and kept it there, turning the turret along the target's flight path with his hand controls. Once the rate of movement was established, the turret followed the target without further adjustment.

The seeker, mounted on the turret, also tracked the target through the sky. What it saw and what the human tracker saw were recorded by the tracking camera for comparison and analysis. The film contained three items of information — cross hairs similar to those of the tracker, a white dot representing the position in space to which the seeker was

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JERRY SMOLKA, head of Oscar & Associates photo firm.

JACK FLANAGAN, Authenticolor Labs veep.

EARL STANTON, manager of Bell Aircraft's photo deparment.

COLOR SEMINAR

JOE SNYDER, president of Color Corp. of America.

ULRIC MEISEL, president of Meisel Photochrome Corp.

RALPH MORRIS, free lance industrial photographer.

ED PURRINGTON, head of Ford Motor Co. photo section.

In January and February we published the answers of a panel of experts to questions commonly asked about color photography. That feature attracted a raft of new questions, so we convened the panel again and put the most commonly asked ones to them. The questions and the panel's answers follow.

Q. As a small industrial photo lab, we have been doing color only for slides. How can we sell our management on other uses of color that will justify expansion of our lab?

The replies to this question are quite diverse. *Livingood* stresses the fact that a small color lab can readily produce Ektacolor prints in limited quantity without need for expansion or extra expenses for dye transfer equipment.

Flanagan suggests the following: "Make up a display of good 8 x 10 inch transparencies of subjects of interest to the company. Make some good big 16 x 20 inch prints. Color portraits of the boss will always help."

Meisel puts himself somewhat on the side of management in replying. "That depends entirely on the use that can be made of larger transparencies or prints in your organization. It is entirely conceivable that slides are all that can be economically justified under a given set of circumstances. However, if there is a sound economic justification for — say — color prints, it might be advisable to make some on speculation, possibly on your own time and with your own materials. Management might be favorably impressed if you should come up with some really nice prints."

Purrington and *Morris* also questioned the idea of "selling" management on the use of color to the extent that department expansion would be necessary.

Morris expounded the following philosophy: "Expand . . . how far? Unless you foresee an annual use of color prints and transparencies in a quantity that will justify doubling your present budget . . . farm (color) out, and keep yourself busy shooting (color) and selling management on its use."

Stanton expresses a view on this question for small labs which is all too true.

"Take some pictures at the company executive's next garden party. If he has a wife, children or pets, do them in color. Make prints on Ektacolor paper or Printon, (as circumstances require) and send them to his office. Wait till you see the parade of friends once they even suspect you can make color prints. I have a stock answer. 'We send all color out; we would be glad to get it done, and bill you. The *bill you* part usually switches the give-aways from color to black and white unless the guy is honest or just plain mixed up."

Q. How do color films compare with black and white in regard to graininess?

On this question the experiences of the panelists have led to considerable diversity of opinion.

Purrington states, "No color material permits print enlargement without appreciable grain [as compared] to the degree [of enlargement] possible [when] working with fine grain black-and-white materials."

Smolka notes, "We have encountered no grain problems whatsoever with negative films. However, we have encountered, on occasions, quite a bit of graininess in certain 35mm direct positive color films!"

Flanagan considers Kodachrome to be practically grainless but has observed that graininess in color films increases with their speed.

Livingood answers "Most color films show more apparent grain than black-and-white films," but he does not consider the graininess of color films a problem, since other qualities of a color image outweigh the grain disadvantage.

Morris expresses the view that unless a photographer was a "miniature" advocate (35mm or 2½ x 2¼ inches) color film graininess was of concern only to firms making murals.

Q. What light source should be used for viewing color prints or transparencies?

Livingood recommends a 4000K light source for a transilluminator, and suggests that it be placed in a semi-darkened room. When comparing a transparency with a color print made from it both should be viewed by the same source of illumination.

Purrington states that when working with art directors and engravers one should make sure that the same standard-type illuminator is used by everyone concerned.

Smolka says "I have heard so many conflicting discussions about the most suitable light source for viewing color prints and transparencies that I now just follow whatever the manufacturers recommend."

Q. Are color prints made directly from color negatives suitable as dye transfer prints for use in a) display b) reproduction?

The answers to this question attest to the fact that in color work the experts often do not share the same opinions.

For example, *Flanagan* replied, "Top quality Ektacolor prints are as suitable for display as dye transfers. For reproduction, dye transfer prints are more easily controlled and corrected. The quality is also better." *Meisel* took a different stand in stating, "Ektacolor prints will serve as well for display or reproduction as Dye Transfers. However, notwithstanding contrary assertions by the manufacturers, we feel that a Dye Transfer has a greater life expectancy than an Ektacolor print."

Stanton expresses the strictly personal view that color prints made directly from color negatives are preferable for display because costs can be kept within a tight budget but notes, "For reproduction it has yet to be proved to me that you can get as good printing plates from negative color prints as you can from dye transfer prints. It should be pretty obvious that you have all the control in the world with dye transfer, whereas I feel limitations do sneak into the control of negative color prints."

Purrington voices an "it all depends" approach. "For display purposes, prints from color negatives are entirely adequate. For reproduction, some are and some are not. The question can best be resolved by discussing it with the engraver who must reproduce from the print."

Smolka has complete faith in color transparencies for reproduction purposes. "We prefer to make direct positive transparencies for reproduction purposes because of the quality differential. For some reason or other, engravers and printers are able to get more sparkle from the transparency rather than the print. We know, however, that good reproduction from Ektacolor prints is available, but where our own pictures are concerned, we prefer the reproductions from transparencies."

Q. What can be done to salvage a job if color film is accidentally processed as black and white?

Livingood states that he knows of no way to salvage a reversal color film if processed as black and white, but in the case of color negatives he has found that the silver image can be bleached back to a silver halide and then reprocessed properly. He points out, however, that although the resultant color negative is printable it is way out in color balance.

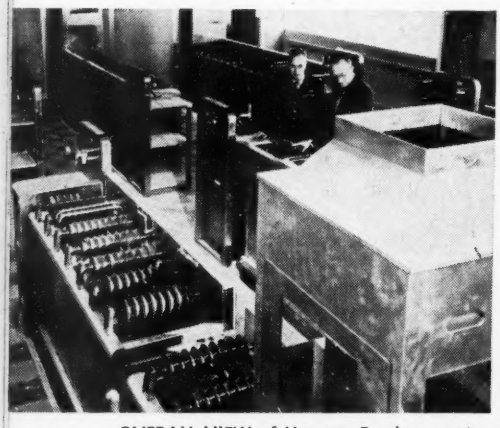
Meisel, Morris, Smolka, Flanagan and *Stanton* gave the following succinct reply: "Nothing!"

Purrington, as well as *Stanton,* called attention to the fact that the Flexichrome Process could be used to salvage color reversal films that have been processed as black and white, although considerable hand work is involved. Eastman Kodak outlines a procedure.

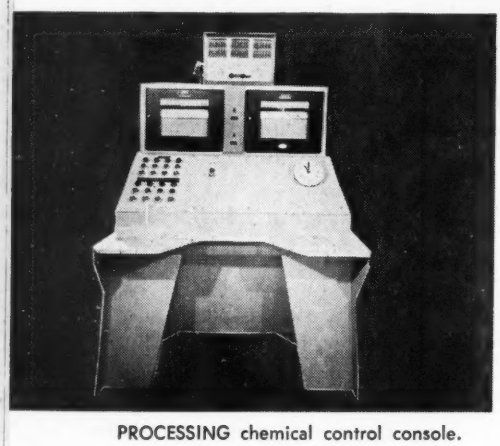
Q. What about bleaching off-balance negatives? Can they be corrected?

The majority reply to this question seems to be that the use of color correction filters in printing negatives is a more sensible solution. In addition, *Meisel* notes that bleaching can be used for off-color positives. The bleaches recommended are those from both Eastman and Ansco. *Flanagan* warns that the use of bleaches has to be watched carefully. Slight bleaching can be effective in making minor corrections but excessive bleaching can lead to disaster. □

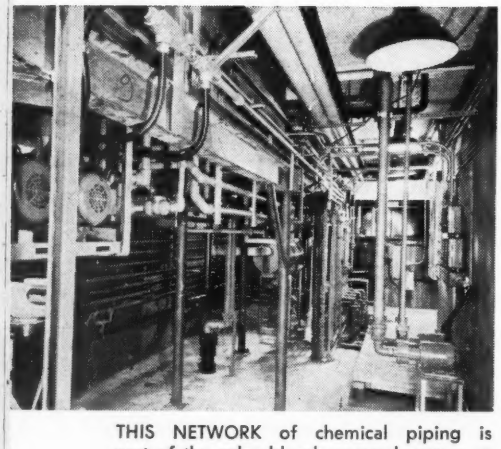
RIGHT: You're not looking at the innards of a brewery, but rather the heart of Cape Canaveral's center for color motion picture processing.



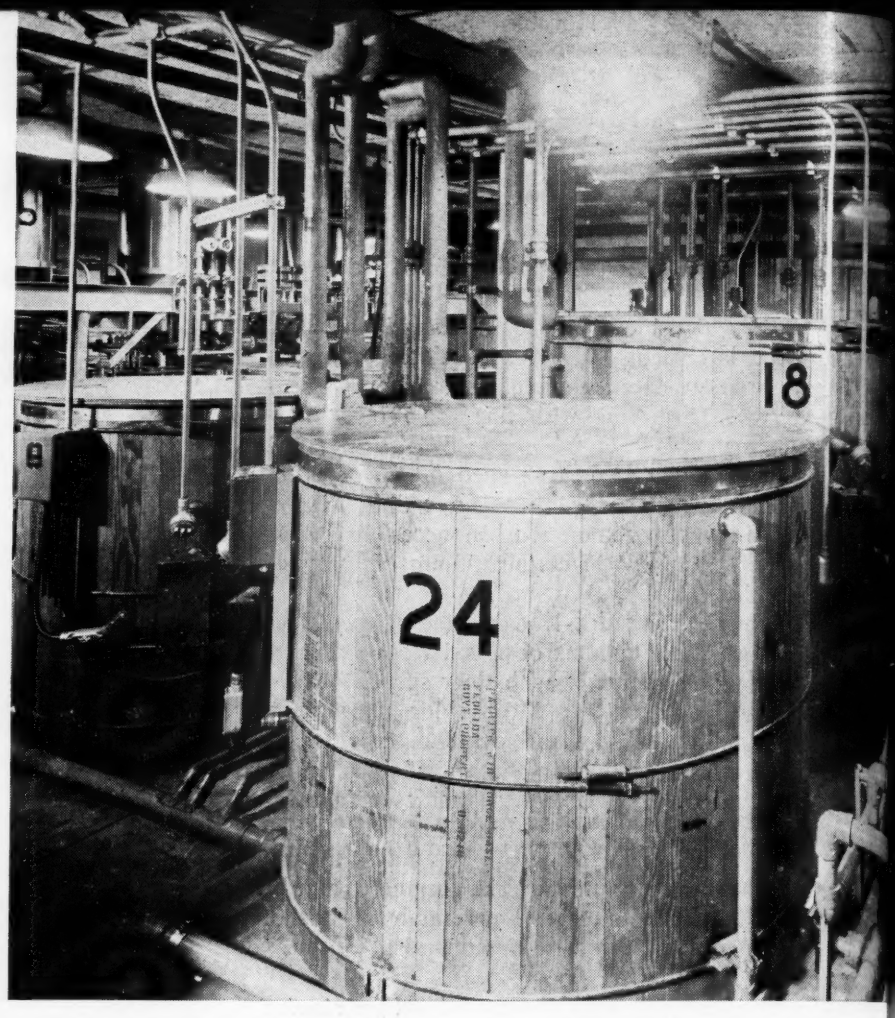
OVERALL VIEW of Houston-Fearless motion picture processing machines



PROCESSING chemical control console.



THIS NETWORK of chemical piping is part of the color bleach reversal system at the new photo lab. At the left is one of several safety fountains for quick wash if personnel become contaminated.



TOMORROW'S LAB TODAY

It seems only proper that Cape Canaveral, America's kickoff point to the future, should be serviced by one of the world's most advanced motion picture labs.

by JAMES HUGHES
Executive Editor

In this age of supersonic long-range missiles, documentary movies have become important tools for U. S. Air Force Air Research and Development Command scientists.

As permanent records of major missile firings, they are used by scientists to evaluate the results of tests and to compare them with the results of previous firings. When a missile misfires, films frequently enable scientists to pinpoint the area or sequence of error.

In keeping with the importance of photography to its mission, the Air Force Missile Test Center, Patrick Air Force Base, Cape Canaveral, Florida, recently began processing film in one of the largest and most versatile film processing laboratories in the world. The $1.4-million facility can process black-and-white and color film — 16, 35 and 70mm.

Eleven processing machines,

FIRST FLOOR LAYOUT of motion picture processing laboratory, Patrick Air Force Base. 1) Micron air filters and air handling units. 2) Chemical mix room. 3) Chemical analysis room. 4 & 5) 16-35 mm b&w hi-contrast negative machines. 6) 16-35 mm b&w low contrast negative machines. 7 & 8) 35-70 mm b&w hi-contrast negative machines. 9) 16-35 mm b&w positive machine. 10) Wide film room. 11 & 13) Wide film dark rooms. 12, 14, 24, & 25) Offices. 15) Chemical storage room. 16) Locker room. 17) Chemical control console. 18) 16-35 mm color negative machine. 19) 16-35 mm color positive machine. 20) Makeup dark rooms. 21) 35-70 mm rev. machine. 22) 16-35 mm color rev. machine. 23) 35-70 mm color rev. machine.

compared with four in former facilities, enable the processing of film much more rapidly than in the past. In addition, the new plant provides complete control over contamination by an elaborate air and water decontamination system.

"This is one of the first military labs built in an operational area designed to process film to commercially acceptable standards," notes W. F. Bischof, Radio Corporation of America production processing manager and installation project representative. "This was a complex job because of the air and dirt problems that exist here," he added. RCA functions as a sub-contractor to Pan American World Airways, which is responsible for the operation of the various stations of the missile test range, including the launching site at Cape Canaveral.

To clean the water used in processing, all solid material particles larger than two microns — a pencil dot is about the same size as 50 microns — are filtered by diatomaceous earth filters. Mechanical filters in two separate airconditioning systems remove all airborne particles larger than five microns.

E. B. Brady, RCA engineer who coordinated the building alterations and machine installation with the close cooperation of Major R. L. Jarman, USAF, AFMTC installation project officer, lists some facts and figures to give an idea of the complexity of the machinery.

"Five miles of chemical piping, 800 valves and 150 pumps transport more than 10,000 gallons of varied solutions from the basement to the processing machines on the first floor," Brady said. "At the same time, used chemicals from the machines are drained to the tanks below for filtering and replenishment. Each pipe bears a color-coded marker with directional arrows showing flow, source and discharge tanks."

Thermostatic controls hold the large volume of solutions within a quarter of a degree of 70 degrees F., well within the tolerances allowable in processing motion picture film. The chilled water machinery that cools the basement recirculating tanks could make 40 tons of ice daily.

One of the several unusual features in the machinery is the impingement-type dryer, which blows a high-velocity jet of hot air on the film at the rate of 3,000 cubic feet per minute as the wet film leaves the final wash stage. This dries the film so rapidly that it is ready for use in less than one minute after leaving the wash.

continued on page 68

Kodak
INDUSTRIAL
ROUND-UP

How to make your own super black-and-white developer

Plus some notes on how to enhance picture quality during and after development

There's magic in this formula. We'll gladly share its secret with you.

But first, a word of caution.

No developer, no matter how good, will work at its best with *any and all* film emulsions. We know this by experience. We've obtained our experience by researching and making developers and emulsions under one roof for a long time.

Emulsion-makers and chemists get together to fit emulsion and chemicals together. Stringent tests prove when the fit is perfect.

Made together, tested together, such materials and chemicals should work best together, used as recommended.

We know of no better way.

Now to the developer:

Be sure all ingredients are fresh, active, completely pure. We always test them to be sure. Also, be sure you don't contaminate them while weighing or holding in storage. These are routine requirements to us, ever so important to you.

Buy the best developing agent you can find. You will be using only a little of it. Carefully store the rest.

We're recommending *two*—Elon and Hydroquinone. Each does a slightly different job. Together, they complement each other to do the total job faster, developing full emulsion speed, maximum shadow detail, normal contrast, when used with proper film emulsions.

Use 2.0 grams of Elon, 5.0 grams of Hydroquinone.

IMPORTANT: Measure these and all your ingredients precisely, as we do, in a carefully controlled atmosphere. We find it's best for quality's sake to do all measuring in a year-round air-conditioned room which has undeviating humidity control. Also, take extreme care not to make mistakes. We use quality control inspectors to prevent mistakes.

Add an "accelerator." The magical ingredient that speeds up the developing process; lets you get out of the darkroom more quickly. Accelerators consist of such simple chemicals as caustic soda, sodium carbonate, ammonia, borax, and others. All are common, proven in use for a long time.

Use 2.0 grams of granular borax as your accelerator.

Now, to prevent your developer from becoming weak too quickly, add a "preservative." One of the more common preservatives is sodium sulphite, desiccated. Use 100.0 grams. NOTE: Be sure of purity, and exact quantities.

Dissolve ingredients in exactly 750 cc of water, heated to a constant 125F. Add water to make a liter.

And that's it! A developer for accomplishing sheer wizardry with films like Kodak Professional Plus-X Pan, Panatomic-X, Tri-X Pan, and others.

It's been tested to work together in a perfect fit with those films.

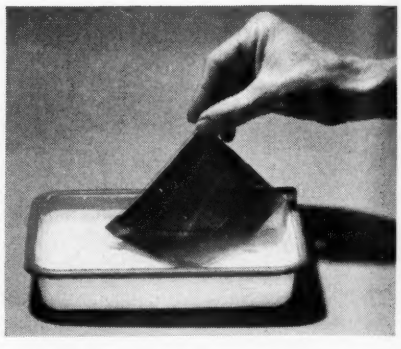
This developer (diluted 1:1) will keep Plus-X grain as fine as advertised. It will let you take full advantage of that film's 200 working index, without shifting contrast. You'll see fine shadow detail, sparkling highlights, delightful middle tones.

Truly, this is a remarkable developer. A real "discovery." As remarkable, in fact, as new Plus-X Film itself.

But why go to all the trouble of doing it yourself?

You couldn't possibly obtain the precision, the quality control, the atmospheric conditions of manufacture, all of which are easy for us. Besides, it will be less costly to you, less time-consuming, if you let us make it for you.

The fact is, we've been making and selling this remarkable developer for a long time. Many professionals are again "discovering" it because results are beautiful with Plus-X Film.



This developer is none other than good old *Kodak D-76*. Sells for 90 cents a gallon, processes 30 rolls per gallon unreplenished.

But note: This time we've recommended D-76 *diluted*. With Plus-X, dilute 1:1 (process approximately 8 minutes at 68F).

You'll see razor-edge sharpness and a fineness of grain, almost as fine as with Kodak Microdol. (Microdol, of course, requires longer development.)

A do-a-lot developer that works best with sheet films

Sheet films—professional. They go hand in hand. But, just as there are different kinds of professionals who take different kinds of pictures, so should there be a developer versatile enough to work together with sheet films, regardless of differences in photographer or subject.

DK-50 is that developer.

Professionals, who like to see nicely graduated negatives because they're the most salable kind, use DK-50, 1:1.

The result is a kind of contrast control, so to speak, where the photographer uses time to his advantage and produces a negative with good gradation through tonal range.

Some photographers, interested in development speed, get what they want to see in a negative by using DK-50 undiluted.

Try DK-50 to get the most out of these films: Tri-X Pan in sheets, packs, and magazines; Royal Pan; Super Panchro-Press, Type B; Super-XX Pan; Portrait Pan; Panatomic-X in sheets; Royal Ortho; Super Speed Ortho; Portrait Sheet Film; Royal-X Pan.

When what goes with what depends on what you want to do

Take prints, for example. And let's talk about image tone.

Did you know we make a developer that will deliberately produce cold tones . . . a developer with excellent development rate and capacity (processes 120 8 x 10's per gallon)? It follows that such a developer works together very nicely with cold-tone papers.

The name: Kodak Dektol Developer.

Try Dektol with Kodak Polycontrast Papers for happy surprises. Try it also for printing impressive glossies intended for graphic reproduction.

This is no ordinary paper developer. Look at its utility value, not only with papers, but also with certain films for rapid processing.

For instance, Dektol with Kodak Royal Pan Film. Develop in a tray two minutes, using Dektol full strength. Result? An invitation to more of the same.

What's the developer recommended for Kodak Gravure Copy Film? Another job for Dektol.

Working together for prints with warm image tone

The flesh, the complexion—these seem more real and alive with the help of warmth in the print. Sunsets, too, take on a glow. And other warm subjects, such as: office interiors, open furnaces, production floors, somehow generate their warmth and "feel" better on warm image tone papers.

But image tone must be uniform to add warmth without intruding. This calls for even rate development, and a special developer that will work together with warm papers to give it to you.

Kodak Selectol is that developer.

It's made to augment the luscious warmth of Kodak PolyLure, Opal, and Ektalure Papers. And, as you know, the warmer the image tone, the better a print is for toning when desired.

Also, we're recommending Kodak Ektonol Developer for these warm papers. This is a non-carbonate developer, meaning it reduces by far the possibility of print spotting or staining. Particularly when prints are to be toned.

When picture quality is done

There are enhancing tricks we feel compelled to remind you of now and then. Some enhance quality, others economy. One, we know, enhances both.

Kodak Rapid Fixer, for example. A fixing bath for both films and papers. A bear for economy, Rapid Fixer fixes 8 x 10 negatives for, at most, $.0017 each (less in large quantity purchases). Fixes prints for, at most, $.00515 each.

We take time to figure these things pretty close.

For quality enhancement, Rapid Fixer has an agreeable characteristic: hardening control as you want it.

Simply vary the amount of Solution B (hardener) according to judgment.

How about print permanence?

Now we're talking about insurance. Insurance that a print will be permanent. And the stuff that insures it is another of those simple items which perfection concedes to the professional, and which we make.

Kodak Hypo Clearing Agent. The one sure way to remove all the silver hypo complex from film and paper.

You may not be getting permanence, due to cold water washes. Add a two minute rinse in Hypo Clearing Agent before washing, and your water can be as cold as 35°. You'll be sure of permanence after only a 20-minute wash. Works the same for film and papers.

Hypo Clearing Agent is the only clearing agent we've found that will do the job we say it will. So why take chances?

Other beauty aids, and economy moves

There are so many pitfalls in film and paper processing and darkroom practice that we've tried to find handholds to offset them.

Here are a few.

Kodak Photo-Flo . . . it makes water wetter so that the water flows evenly from your film. Preventing water marks and streaks in the first place.

Kodak Indicator Stop Bath is a concentrate. Sixteen ounces makes eight (8) gallons of good, professional stop bath, at a list price of $1.10.

One-half (½) ounce makes a trayful, or a quart, which will process twenty 8 x 10's, at a cost of only three and one-half (3½) cents.

But there's another telling feature that adds even more value to Kodak Indicator Stop Bath.

When it's used up, it tells you to stop using it. It turns purple, which under safelights looks black. When it looks that way, you know it's time to sewer it. And that's a good thing to know about stop baths.

There is a way to avoid print curling, embrittling, cracking, as sometimes happens in the wintertime in heated buildings. Use *Kodak Print Flattening Solution*, which helps keep moisture in the print. Soak prints before drying.

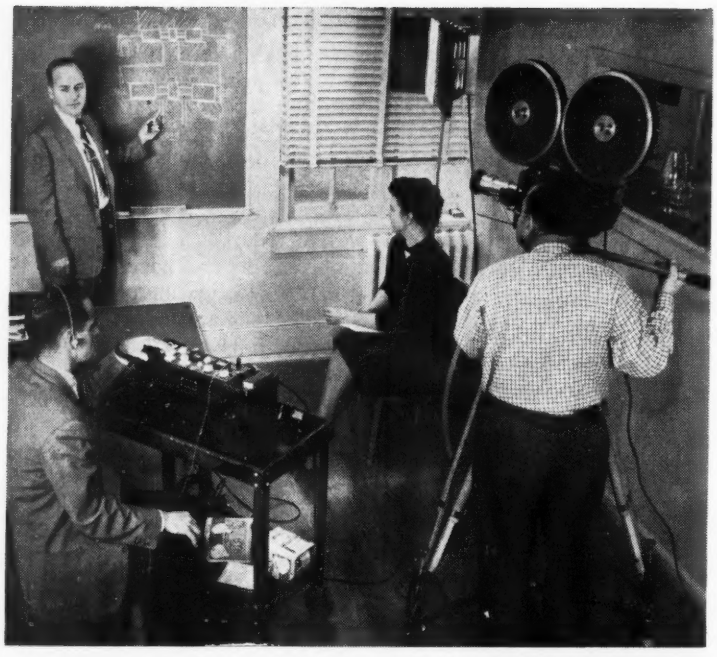
What else?

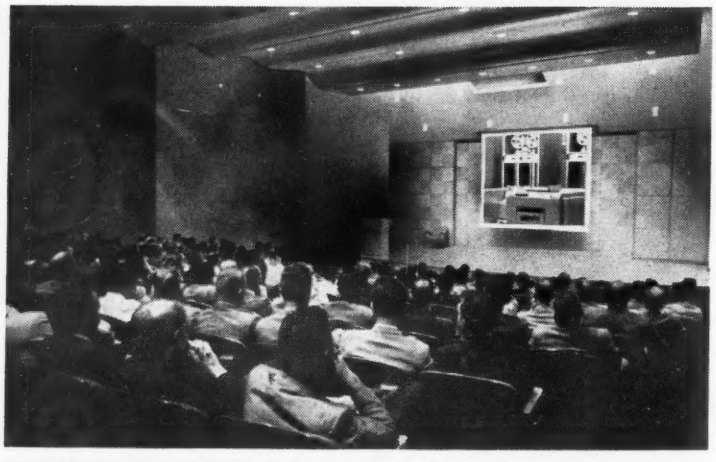
Stick to those products made together to work together. Your good results will be consistent that way.

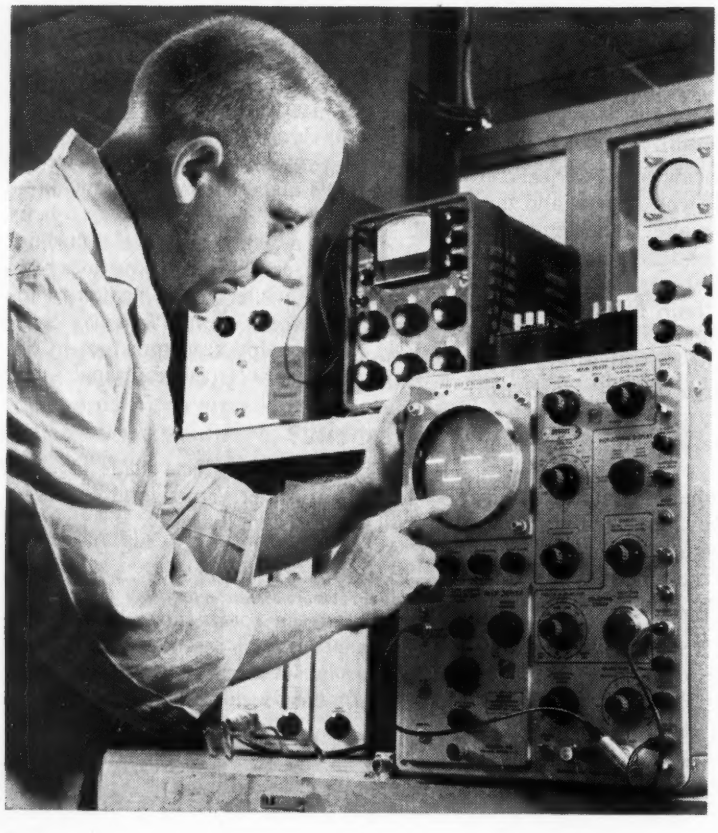
Prices are list, include Federal Tax, and are subject to change without notice.

EASTMAN KODAK COMPANY, Rochester 4, N.Y.

Kodak
TRADE MARK







NEW LOOK IN TECH MOVIES

Using unorthodox techniques IBM's moviemakers keep engineers abreast of company projects.

by MARGE T. BRISLIN

IBM Product Development Lab
Poughkeepsie, N. Y.

New methods are afoot these days in the movie department of the International Business Machines Corporation. By applying new techniques the company is producing a greater quantity of up-to-date, low budget technical films which depict engineering and research projects within the company. These movies are circulated to the IBM engineers who find them a great help in keeping informed on new devices, ideas and processes being developed by their colleagues.

IBM has always made instructional films to supplement the barrage of reports, bibliographies, library bulletins, technical displays and scientific publications which are distributed to the engineers. In the past these films,

continued on page 64

TOP, equipment is moved to the engineer's work area for IBM's technical films.

MIDDLE, engineers at branch plants view these films made for instructional use.

BOTTOM, close-up of oscilloscope helps explain project being described in movie.

GRAPHIC® ACCESSORIES

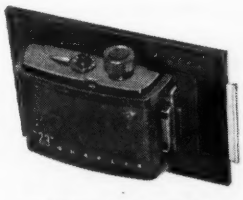
MAKE YOU MASTER OF ANY JOB . . .

4 x 5 Super Speed Graphic with 135mm Optar lens in Graflex 1000 Shutter

Graphic owners—you can enjoy the fullest capabilities of your camera by utilizing the many and varied Graphic accessories. In fact, the wide range of accessories available for the Graphics is a big reason why Pacemaker Graphics, Super Graphics and Super Speed Graphics are so popular among press, professional and industrial photographers everywhere.

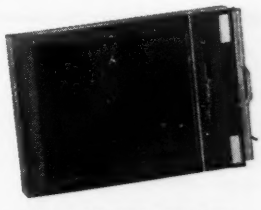
Each of the accessories shown below has been designed with you in mind. They'll enable you to do any job better, faster and easier. Examine each one at your Graflex dealer. Or, write for full information to Dept. P-50, Graflex, Inc., Rochester 3, N. Y. A subsidiary of General Precision Equipment Corporation.

GRAFMATIC FILM HOLDER
Holds six sheet films yet is almost as thin as a two-sheet holder. Film changing is lightning fast. Invaluable for sequence shots. $28.95.

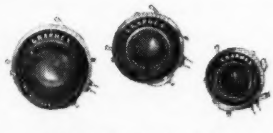


GRAPHIC ROLL HOLDER
Quickly adapt the Super Speed Graphic camera for use of low-cost, daylight loading black and white or color roll film. Uses inexpensive 120 size roll film. $27.95.

POLAROID BACK
This special back is especially valuable, enabling the photographer to check exposure, lighting and composition quickly and economically before shooting more expensive film. $83.50.



RITEWAY FILM HOLDER
The ultimate in film receptacles! Provides most accurate film positioning of any holder on the market. Unconditional two year guarantee. Cannot warp. Easy to use. $4.95.



ACCESSORY LENSES
Interchangeable lenses in focal lengths from 65mm to 380mm (15") are available for Graphic cameras. Listings include wide angle, special purpose normal and telephoto lenses.

GRAFLITE FLASH
Graflite is the one flash outfit that will meet any flash requirement. A full line of Graflite components for any application. $27.95 up, less batteries, with 5" reflector.

STROBOFLASH
Stroboflash electronic flash units are used and approved by professionals everywhere. From $99.50 to $165.95 less batteries.

NEW! GRAFLEX SPEEDPRO TRIPOD
This new tripod is made to order for 4 x 5 Graphic cameras. Heavy duty. 2-section. With 11" center column. Extends to 68". Weighs only 4¾ lbs. $44.50.

DIVIDING BACK
This accessory permits taking two exposures on a single piece of film. Extensively used in photographing products and processes where reproductions are to be small. Cuts film and processing costs in half! $34.50.

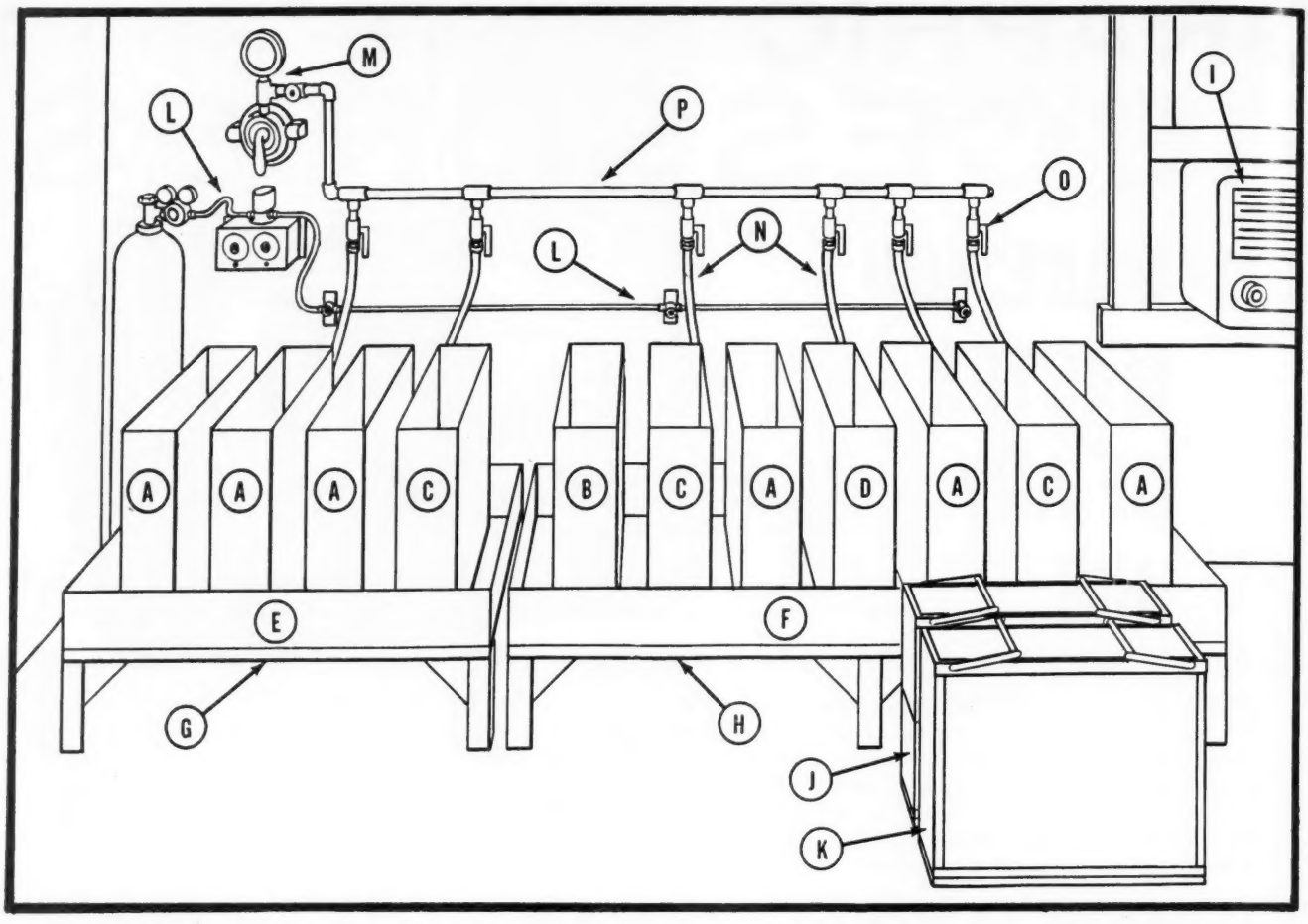
TELEFLASH
Teleflash is a B-C powered slave flash unit that can be triggered by its light-sensitive photo tube. Perfect for lighting large areas from the flash unit on the camera. With batteries and clamps, $79.00.

FILM PACK ADAPTER
Indispensable where convenience of quick reloading and conservation of film carrying bulk are important. Accepts 12-exposure packs and slips into camera back like any other film receptacle. $13.95.

**Trade Mark. Prices include federal tax and are subject to change without notice. See your Graflex dealer.*

GRAFLEX® IP-40 | A GENERAL PRECISION COMPANY

Circle No. 547 on Post Card



A. 6 stainless steel 10-gal. 16x20 processing tanks with drains.
B. Epoxy coated stainless steel 10-gal. processing tank for bleach service.
C. 3 stainless steel standard wash tanks with spray tube and hose adapter.
D. Stainless steel quick-dump wash tank with spray tube and hose adapter.
E. Stainless steel sink pan, 30x36x8".
F. Stainless steel sink pan, 30x72x8".
G. Low stand for sink "E".
H. Low stand for sink "F".
I. Air conditioner.
J. Four section 8x10 color print processing basket and gas distributor.
K. 11x14 to 16x20 color print processing basket and gas distributor.
L. Nitrogen agitation group.
M. Water temperature regulator group.
N. Water hose group.
O. Chicago Model 45 "Quarturn" Stops-½" Right-Hand Cold.
P. The following standard galvanized plumbing fittings will also be required for the water supply line: two ¾" ells; six ¾"x¾"x½" tees; one ¾" plug; six ½" close nipples; and seven ¾" long nipples of miscellaneous lengths.

Low Cost Color Processing

by A. L. SCHWARTZ
Grafic Equipment Co.

With the introduction of Kodak Ektacolor Paper (formerly Kodak Color Print Material, Type C) in 1956, a new era in photography was begun. The production of high-grade color prints at low cost was made possible, and color photography moved much closer to that day when it will be used more extensively than black-and-white processes.

In smaller print sizes and limited volumes, the new process presented no special processing problems; for the most part, existing equipment was used. However, larger prints and larger quantities were soon demanded, and the design of new equipment was required, as nothing existed for this purpose.

The first equipment to be marketed on a national basis for these larger requirements was completely factory assembled as a unit with all necessary components and controls built in. Of necessity, cost of such equipment is very high. Other manufacturers followed suit, and the impression grew that only these expensive units could do the job.

In truth it is possible to process prints on a practical production basis with a much smaller investment than is generally thought to be required. Diagrammed above is a representative 10-gallon processing installation that will accommodate print sizes up to 16 x 20 inches in large volumes. The line has been assembled from separately available components, as has been standard practice with smaller processing lines, and

continued on page 56

What could possibly make a camera worth $500?

THE work you can do with it, nothing else.

The precision and resolving power, for example, that have led many studio photographers to use a Hasselblad 2¼ x 2¼ single-lens reflex instead of an 8 x 10 view camera.

The interchangeability of lenses, film backs and accessories—over 100 camera set-ups in all—that enables a professional to carry a Hasselblad instead of half his studio on location assignments.

The automatic aids that let the pro concentrate on his subject instead of the camera, and help the amateur make up in part for the intimate knowledge of light and optics that marks professional work.

Hasselblad lenses, for instance, make color and detail almost automatically perfect. These lenses have Synchro-Compur shutters and are made by Carl Zeiss of the best optical glass in the world. Resolving power—the acid test of any lens—permits greater enlargements than virtually any other lens made today.

The Hasselblad reflex system alone costs more to make than many cameras sell for. On its ground glass viewer you see a print-size preview of the quality you will get—focus, depth of field right through the lens (and no parallax). A pop-up magnifier even shows details too tiny for the naked eye.

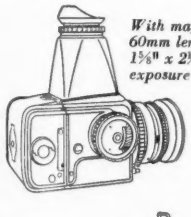
Diaphragms of Hasselblad lenses are automatic. They remain open until you shoot, so that your view cannot get away from you. If you wish, you can also stop the diaphragm down by hand.

The EVS system synchronizes diaphragm openings to shutter speeds. You simply set your lens for a code number and your speed and aperture will be automatically aligned. You can then change to any other speed and your aperture will change with it—automatically.

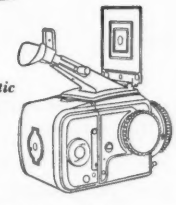
Hasselblad interchangeability? You can switch from color to black and white in mid-roll, or from telephoto to wide angle, or to a sports viewer, or to a magnifying hood for shots through a microscope. You can set up for almost every shot known to photography in seconds.

What could possibly make a camera worth $500? The work you can do with it, nothing else. With Zeiss Planar 80mm f/2.8 lens, $489.50.

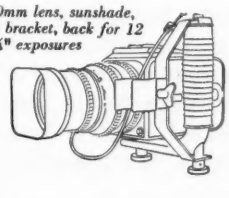
Write Dept. HIP-4 for literature and the name of your nearest Hasselblad dealer. PAILLARD Incorporated, 100 Sixth Avenue, New York 13, New York.



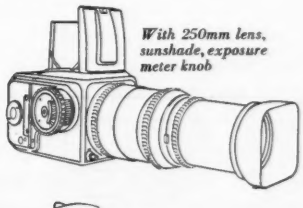
With magnifying hood, 60mm lens, back for 16 1⅝" x 2¼" exposures, exposure meter knob



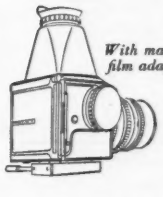
With prismatic sports finder



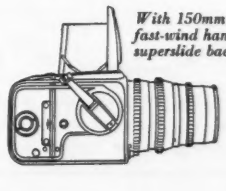
With 150mm lens, sunshade, flash gun bracket, back for 12 2¼" x 2¼" exposures



With 250mm lens, sunshade, exposure meter knob



With magnifying hood, cut film adaptor and holder



With 150mm lens, fast-wind handle, 2" x 2" superslide back

HASSELBLAD

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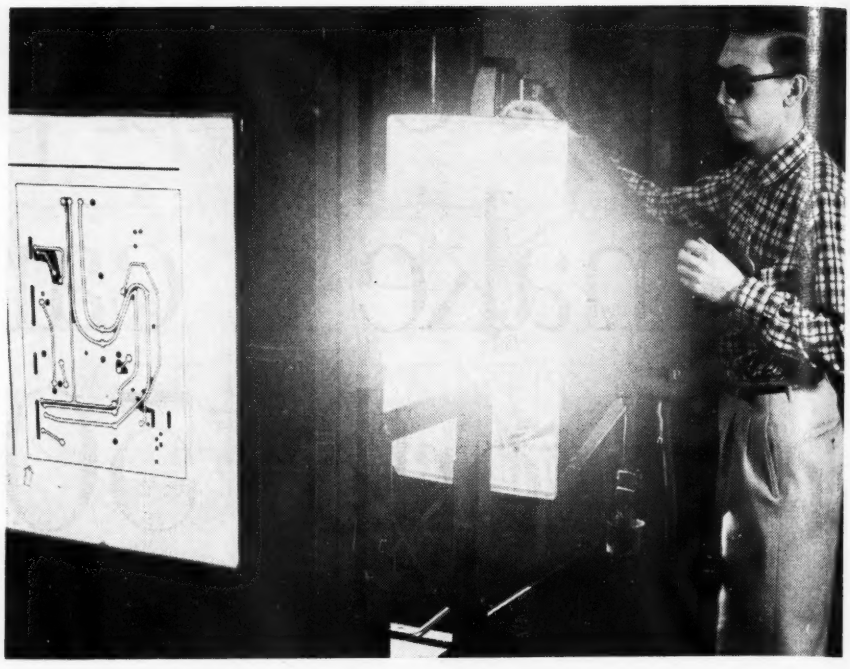
Reproduction in Industry

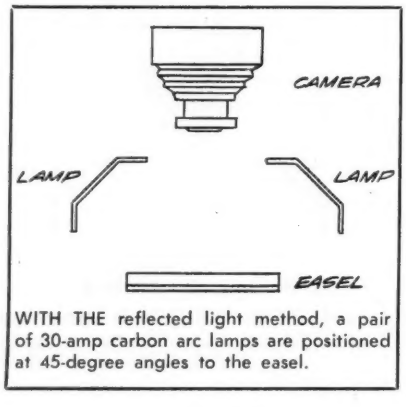


COPY IS placed in a vacuum frame under pressure and exposed to carbon arcs in reflected light shooting.

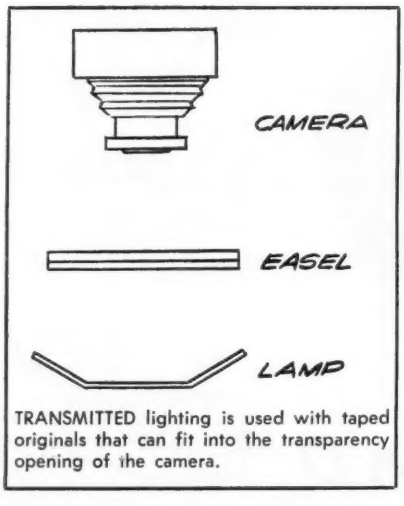
No Room for Error

You need critical accuracy to reproduce printed circuits and lighting can trip you up if you don't watch out.

by HAL DENSTMAN and MORT SCHULTZ,
Lockheed Electronics Co., Stavid Division



WITH THE reflected light method, a pair of 30-amp carbon arc lamps are positioned at 45-degree angles to the easel.



TRANSMITTED lighting is used with taped originals that can fit into the transparency opening of the camera.

Reproducing printed circuits photographically is a technique that has revolutionized the production of electronic systems, but it leaves no room for error. It calls for critical accuracy all down the line — in preparation of the original drawing, in selection of a stable base material to draw onto, in the choice of a dimensionally stable photographic film and in the alignment of the copy board and film plane of the reproduction camera.

Equally critical is the handling of lighting during actual shooting. A careless step can undo all previous precautions. At Lockheed Electronics we use two basic methods of lighting and lots of care.

Reflected (front) *lighting* is used when the drafted original exceeds the size of the transparency opening in the copy frame. Most reproduction cameras have this transparency opening, which employs a sheet of frosted or opal glass when photographing color transparencies by using transmitted light passing through the transparency. When reproducing printed circuit originals, the size limit of the easel frame —30x40″— is reduced one inch in each dimension to allow for shadows at the edges.

With the reflected light method, the drafted original is placed against a white mat in the easel frame. A pair of 30-amp carbon arc lamps are positioned at 45° angles to the easel (See drawings) and the light is reflected from the image surface to the lens.

Reflected light is ideal when

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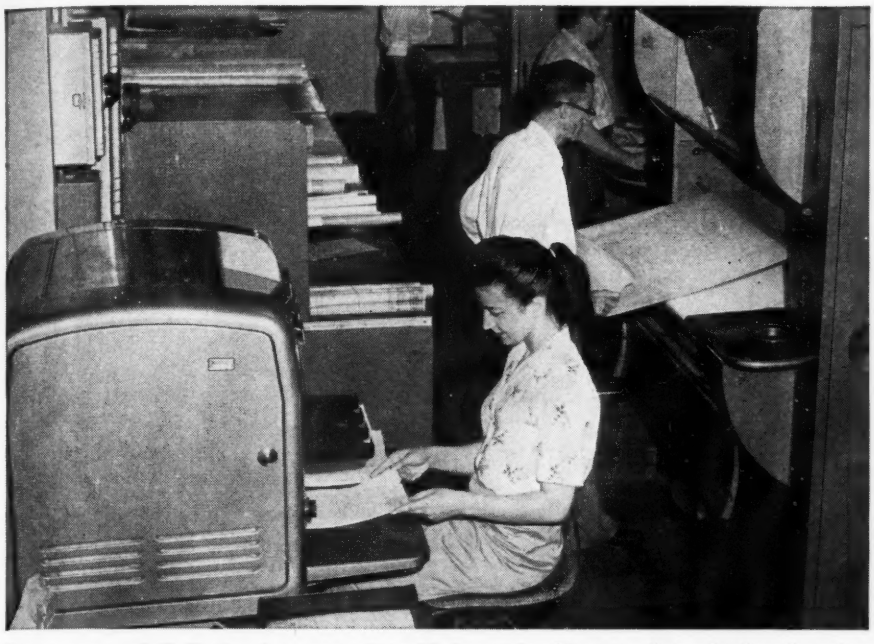
OZALID NEWSLETTER

NEWS AND IDEAS TO HELP YOU WITH ENGINEERING REPRODUCTION AND DRAFTING



Repro room at I-T-E, showing processing of Information Sheets and standard engineering drawings on Ozalid machines. Simple system saves hours of drafting time for the company.

Short-cut system for custom orders

To help turn out "job shop" work at assembly line speed, the I-T-E Circuit Breaker Company of Philadelphia has devised a simple "Information Sheet" that does away with considerable retracing and revising of engineering prints.

More than 70% of I-T-E orders are for custom-designed equipment using standard components. Revising standard drawings to meet customer specs on each order would saddle I-T-E's engineering department with a nearly impossible work load.

So the Information Sheet is used instead. It's an 8½" x 11" tracing form—with printed title blocks—quickly reproduced on the company's Ozalid whiteprinters. Here's how it works:

An order comes in—for 5KV metal-clad switchgear, for instance. A fast freehand sketch of the switchgear is drawn on the Information Sheet. Drawing numbers of standard components and quantity of prints needed are noted on the Sheet.

Then, copies of the Sheet and the required standard drawings are run in the I-T-E repro room. These, with the shop order, go to Manufacturing. When the order is completed, the Information Sheet is returned to the customer file for reference.

This simple short cut with Ozalid whiteprinting saves untold hours of engineering time and gives I-T-E customers faster, more efficient service.

Colors speak louder than words

A simple way to make your security personnel's job a lot easier is to color-code all classified material by using Ozalid sensitized color-copy papers. Colors don't have to be read. Guards can spot restricted or top-secret prints at a glance. Clerks can't make routing mistakes.

To help you devise your own color-coding systems, Ozalid offers papers with eleven image-and-stock color combinations. For example, use black image on yellow stock (instead of traditional blue on white) to code prints of preliminary drawings. Potential uses for color-coding in engineering paper work are virtually unlimited: shop orders, bills of material, spec sheets, change notices, cost estimates, etc., etc.

Like a copy of our new Color-Coding Booklet? It tells how a truly versatile, full-range color-coding system can be yours with as little effort as it takes to run prints that are black on white.

Just write to Ozalid, Johnson City, New York. Booklet No. P4.

New blue-tint Ozacloth cuts glare, saves eyes

It's bad enough to have *people* glare at you. When your drafting materials glare too, one should take steps. Our research people have—by building a delicate blue tint into our new black-line Ozacloth 101 CZB. It provides excellent contrast between background and dye image—cuts glare, reduces eye strain, makes duplicate originals that are easy to read and work with. Other features? Highest printing speed of any cloth intermediate . . . and a plastic matte surface *on both sides* which accepts pencil, ink or typewriter . . . and keeps sheets from sticking together in files. Write Ozalid at Johnson City, New York, for free descriptive literature on blue tint Ozacloth.

***Ozalid**—Division of General Aniline & Film Corp. • In Canada: Hughes-Owens Co., Ltd., Montreal*

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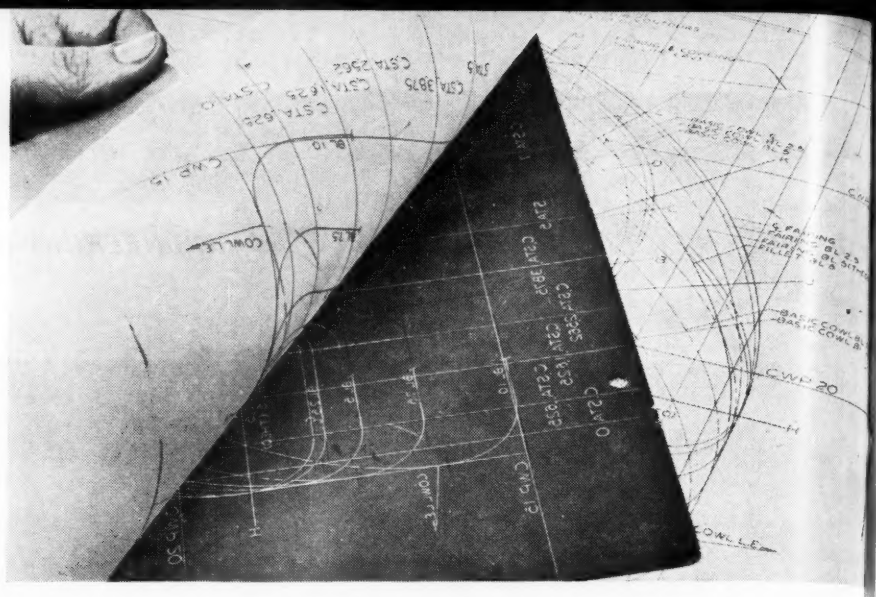
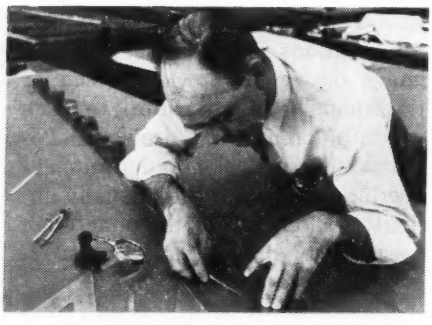
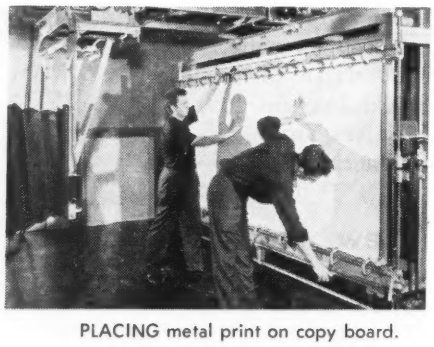




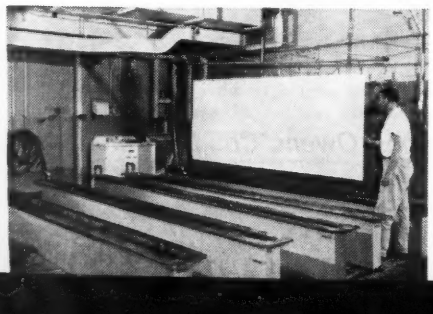
SCRIBING a line on the master.



PLACING metal print on copy board.

X-RAY printer receives lines board.

METAL print being processed.



Accuracy in Quantity Production

by A. K. KENNEY

For complete accuracy in quantity production of duplicates of the basic or master lines of airplane parts, the Columbus Division of North American Aviation, Inc., is using a combination of fluorescent paint, ultraviolet light and photosensitive materials. This method of duplicating the master lines provides more dimensional stability than any other method the division has tried.

The first step in the operation is the painting of a large metal plate, sometimes as large as 4x10 feet, with a primer coat of white paint. This is covered with a coat of fluorescent paint and finished with a masking coat of dark green paint.

A draftsman lays out the contours of the desired parts on the plate by carefully cutting through the masking coat to the fluorescent layer with a steel scribe. The usual draftsman's tools — straight edges, triangles, etc. — are used in the process.

After the design is cut on the metal plate (commonly called the master lines board) it is sent to the photographic department. There it is placed on a printer table in contact with K & E Mylar #591 film or a sensitized metal plate. The ultraviolet lighting unit below the table is then turned on for about one minute.

The ultraviolet rays cause the fluorescent paint to glow brightly through the lines of the master lines board, thus transferring the design to the sensitized metal or the film. The depth of the scribing cut determines the time needed for exposure to the ultraviolet light. Slight variations in the size of these lines will result from slight variations in pressure on the scribe.

The exposed metal or film receives normal photographic development in tanks 15 feet long by six feet deep, holding 300 gallons of solution. After development, the film or metal is hung about an hour in a small drying room with circulating air.

The dry reproductions go to the Layout and Templates Departments to be used for tracings or to be cut apart into the actual templates.

When parts are desired for use in making scale models, drawings are first enlarged or reduced as required in a Lanston 40x40-inch precision template camera.□

Now! Get Famous Paragon-Revolute *Quality and Advantages in New Table Model Whiteprinter!*

The great new 42″ table model Revolute Rockette brings the outstanding benefits and quality of Paragon-Revolute diazo-type reproduction within reach of the smallest firm or department. It brings sizable auxiliary capacity, with compactness, easily within the means of larger firms.

The Rockette offers important advantages not found in most table model whiteprinters. Its 42″ printing width, 15 fpm speed, and 1500 watt vapor lamp provide unusual operating flexibility and capacity. Synchronized developing and exposure speeds assure sharp reproduction especially for longer prints. Exclusive patented perforated rollers provide faster development, shorter travel, and lower ammonia consumption. With the Rockette, you can utilize the widest range of materials to meet every reproduction requirement. Especially useful are intermediates that expedite design changes, save many hours of drafting.

You have everything to gain, nothing to lose, by investigating this professional, low-cost whiteprinter. The coupon brings you full details promptly.

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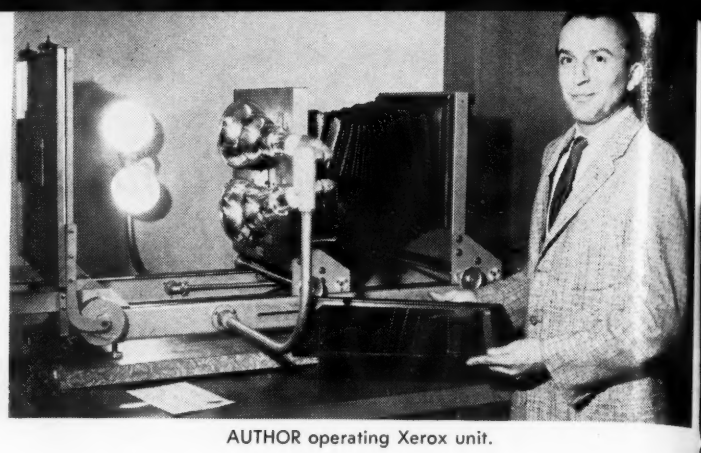
Lightening the Load



AUTHOR operating Xerox unit.

by G. C. BECHTLE
Supervisor, Reproduction Dept.
Richfield Oil Company

Over a period of several years, Richfield's photo reduction department had been experiencing increasingly heavy work loads, tighter schedules and, consequently, an ever growing backlog of work.

When we purchased a 10-foot Bruning vacuum frame, we thought that we had solved our production problems for years to come. However, such was not to be the case. The backlog continued to grow.

Our next thought was to install additional arc lights, and with shorter exposure times be able to expose more film in a work day. But we discovered that because of limited space in our department, the arcs would partially block a passageway, and people would have to pass in front of them during exposures. We also hesitated to install the additional arcs because of the high cost of additional power lines to handle the load.

We then experimented with fluorescent tubes. They seemed to produce an amply brilliant light and also were clean and quiet. Again we ran into cost troubles. To significantly reduce exposure times would require more than 40 tubes, and the cost of the attendant equipment to hold and control the lights was out of proportion to any possible advantage.

A short time later we happened to visit a large blueprint shop. There we saw several incandescent installations at work. They seemed to be the answer. So we ordered an eight-light ColorTran unit from our local dealer on a trial basis, and for the next two weeks put the lights through an exceedingly rigid series of tests. Accurate records were kept of every exposure and of the different types of materials used.

We were truly amazed by the results. For example, in making a Cronaflex from an Imperial cloth original, the arc lamp exposure required was 35 minutes, the fluorescent light exposure five minutes, and the incandescent exposure only three minutes. Every other reproducton material tested on the frame indicated the same comparison in relation to exposure time. We also had the sharpest and cleanest films ever seen in this department.

We saw that we had at last found the answer to our production problems, and determined that we would need two 16-light ColorTran units to provide even illumination over our 10-foot copy board. The cost for these units, with the converters, was considerably less than the fluorescent lighting set-up we had previously planned.

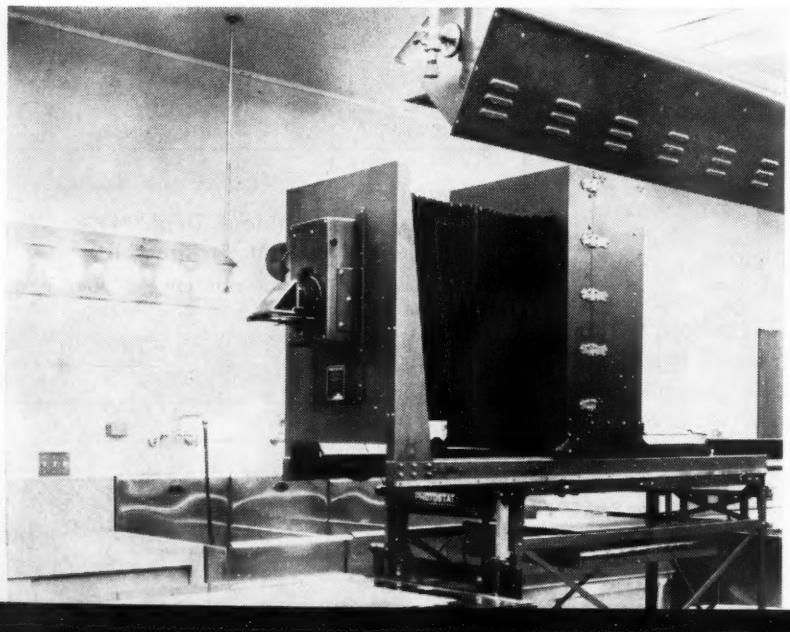
The shorter exposure times plus easier operation have enabled us to increase our production more than 100 per cent, and we no longer have a backlog.

We have also saved considerable time by keeping the vacuum frame in a horizontal position at all times, with the units on the floor. It is surprising how many man-hours are saved by not having to raise and lower the board.

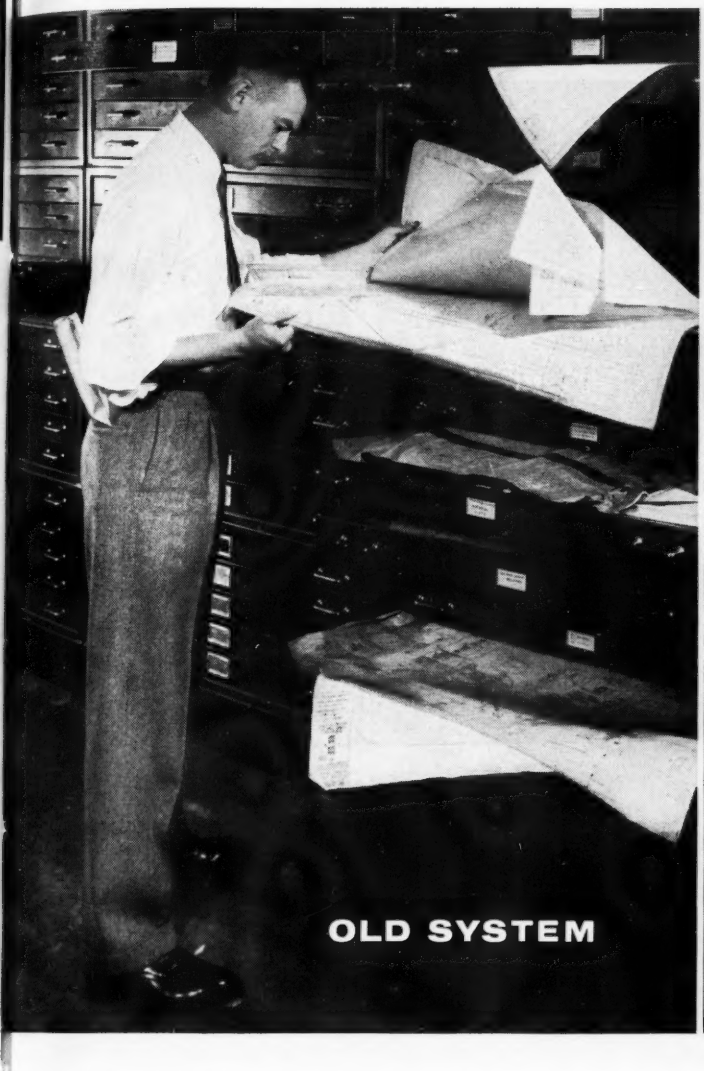
Another advantage is that the glass is not as susceptible to dust in this position. The lights are positioned 24 inches from the glass, pointed upward at a 45-degree angle. The converters are mounted on the wall and are controlled by a timer switch. Still another unexpected advantage was gaining 85% more floor space in the vacuum frame area.

We have since installed ColorTran lighting equipment on our Haloid Xerox #4 unit and also on our Photostat equipment. □

PHOTOSTAT CAMERA with ceiling-mounted ColorTran lighting.



thanks to *automatic* xerography...

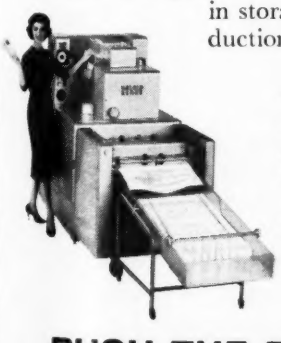


REDUCE DRAWING-STORAGE SPACE UP TO 95%

Save $20,000 to $100,000 yearly on time, labor, and materials!

How would you like to reduce—by as much as 95%—the storage space you now allot to active and inactive engineering drawings?

In so doing, you'll also reduce time and labor costs dramatically. Savings as high as $100,000 a year can be achieved because of a spectacular breakthrough in storage and reproduction techniques.



This development, called a unitized microfilm system, has three basic steps: microfilming original drawings or changes; mounting individual frames into diecut apertures of data-processing cards; and, from the cards, automatically enlarging the microfilmed drawings by xerography, fast and economically, in a XeroX® Copyflo® 24C continuous printer.

Dry, positive prints, translucent intermediates, or offset paper masters emerge at the rate of 20 feet a minute. They are automatically cut, and ready for immediate use.

The aperture cards, which may be machine-sorted for any combination, are stored in miniature working files, occupying only a tiny fraction of the space required by blueprints, intermediates, or originals.

There is no refiling. The quality of xerographic prints is superbly high, yet they are so inexpensive that engineers are urged to discard them after use.

Unitized microfilm systems offer many other striking economies in time, money, and materials. Our booklet X-300, showing the many benefits, is yours for the asking. Write HALOID XEROX INC., 60-309X Haloid St., Rochester 3, New York. Branch offices in principal U. S. and Canadian cities.

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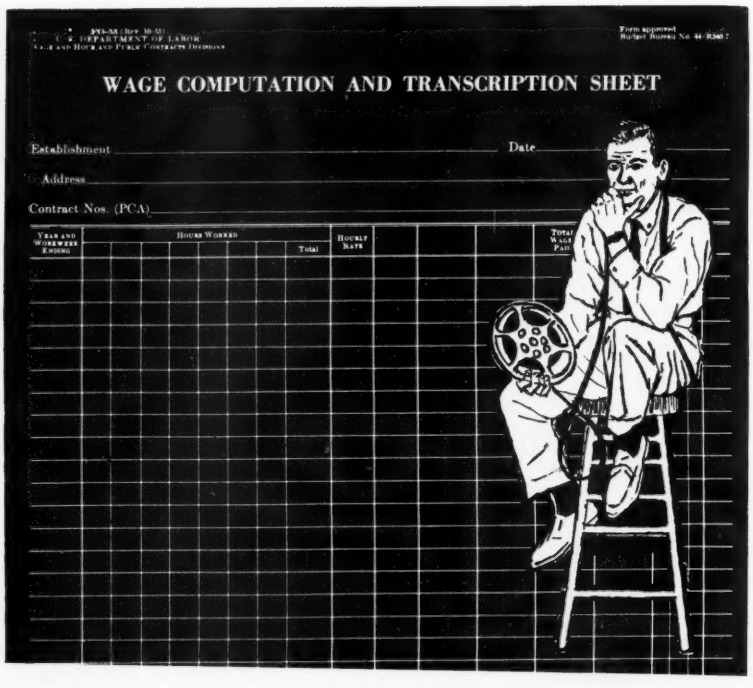
PHOTO DEPT. MANAGEMENT



Computing Salaries and Overtime

With the growth of photographic departments in size and responsibility, more and more industrial photographers are getting exposed to administrative as well as technical details. To many, it is a completely new experience. Because of a growing reader interest, IP this month begins a new series on photographic department management. As a start, a former federal wage-hour inspector and administrator offers some tips on how salaries and overtime payments are computed, a subject of vital interest to both workers and management.

by ROBLEY D. STEVENS

A real source of grievances to every administrator is the twin problem of overpayments and underpayments on wages. Often, lack of knowledge leads to a larger overtime bill than necessary because of incorrect computing methods. Or it may lead to dissatisfaction on the part of employees who feel they should have received greater compensation. Yet the basic rules and regulations are simple and easy to understand.

In substance, the Fair Labor Standards Act, which applies to all employees engaged in interstate commerce or in work that is essential to a company's interstate commerce activities, states that anyone covered by the law must be paid overtime for work beyond 40 hours weekly. *(This applies to photographic and industrial operations in many major company operations.—Ed. Note.)* Naturally there are exceptions; these are administrative and executive workers. Duties rather than titles determine whether an employee is classified as administrative or executive.

An executive employee is one whose primary duty is the management of a recognized department; who regularly directs the work of at least two full-time employees; who can hire or fire or recommend hiring or firing; who devotes at least 80 per cent of his work week to executive duties; and whose salary is at least $80 a week.

An administrative worker is one whose primary duty is important office or nonmanual field work; who regularly exercises discretion and judgement as distinguished from using skills and following procedures; who devotes at least 80 per cent of his work week to his administrative duties; and who earns at least $95 a week.

These salaries are for exemption purposes only; there is no requirement that a company has to pay these salary minimums to persons doing executive or administrative work. However if an employee does not meet the salary, as well as the qualifications of duties and responsibilities, he does not qualify as an executive or administrator and is eligible for overtime.

The regulation limiting the amount of non-exempt (non-executive or non-administrative) work is to distinguish between the bonafide executive or administrator and foremen or working supervisors. The latter spend sub-

continued on page 72

ANOTHER DIAMOND JUBILEE PRODUCT FROM HONEYWELL

have you seen it yet?

the most talked-about camera in years

HEILAND PENTAX H-2

No wonder photographers are talking about the Pentax! It's the lightest, trimmest camera in the entire single lens reflex field. And it's simplicity itself to operate, with no unnecessary, complicated gadgets—just precision controls that help you get the best pictures you've ever taken—

the brightest of all pentaprism viewfinders makes it easy to keep the life-size image constantly in focus. You look through the lens—get exactly what you see!

- the instant return mirror gives uninterrupted, follow-through viewing.
- the automatic diaphragm operates only when you want it to.
- the single, non-rotating speed dial has speeds from 1 sec. to 1/500 sec., plus Time and Bulb.
- the razor-sharp, 6-element 55mm f/2.0 Auto-Takumar lens is the fastest available for the price.
- With this lens, the Heiland-Pentax H-2 is only $179.50.

There's a complete line of Pentax accessories and interchangeable lenses, too—from macro attachments for extreme close-up work to a 1000mm lens that will bring out the smallest features of subjects half a mile away.

Honeywell

Heiland Photo Products

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See the Pentax demonstrated now at your photo dealer, or write for free folder, describing the Pentax and the complete line of eleven lenses, and accessories.

PICTURE IT NOW... SEE IT FOREVER

A. 35mm Auto-Takumar, f/2.3 $124.50 • **B.** 105mm Auto-Takumar, f/2.8 $124.50 • **C.** 135mm Takumar, f/3.5 $89.50 • **D.** 300mm Takumar, f/4.0 $279.50
E. 500mm Takumar, f/5.0 $350.00 • **F.** 1000mm Takumar f/8.0 $1195.00 • **G.** Shown on Pentax-Bellows Unit $29.50, Right-Angle Finder $29.50

Circle No. 551 on Post Card

NUCLEAR REACTOR is dismantled at the Atomfair in N.Y.'s Coliseum. Shot includes containers of the display elements — useful to crews repacking at future trade shows.

Assignment: Trade Show

"A stitch in time" can smooth the way when you go out to cover a show.

by DAN SCHERER
Public Information Manager
Atomic Industrial Forum

A trade show is a fast-paced extravaganza that usually lasts a maximum of seven days. That's why the industrial photographer assigned to take pictures of his company's exhibit must plan ahead. As the manager of full-scale industrial exhibitions in a variety of locations I have had a chance to get a birdseye view of the problems faced by the photographer when he works at a trade show. Many of the difficulties that arise can be avoided with a resultant savings in time, money and frayed nerves.

If you plan on covering an exhibit the first step is to contact the show's manager and get his permission to take pictures. This is important because the trade-show management may have given a commercial photography studio sole rights to cover the show. Obtaining this permission is best done through the man in your company in charge of exhibit arrangements. At the same time see that your models secure badges of admission and that you have a property pass to cover the gear in your bag.

The type of shot you need will determine when you do your work. If the assignment calls for photographing a piece of equipment without observers then shooting before or after hours has to be the answer. Naturally, if you want to catch people clustered around the booth pick an hour when the show is open and crowded.

Photos destined for spot news publicity are best taken when the

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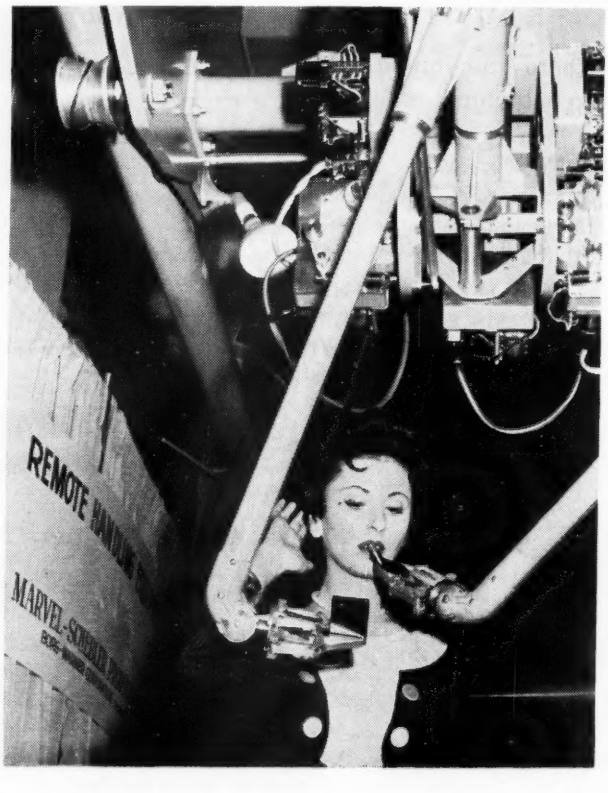


LIPSTICK is applied to girl to show operation of remote control manipulators. Note company identification.

HOW WOULD YOU HAVE LIGHTED THIS PICTURE?

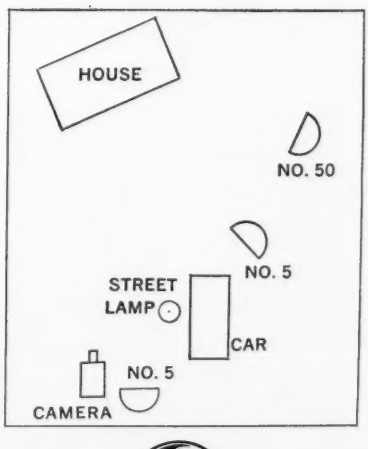
PHOTOGRAPHER RICHARD STACKS MAKES FAST TRACKS TO FREEZE BALTIMORE SNOW STORM WITH G-E FLASHBULBS

"This turned out to be quite an athletic assignment," writes Baltimore Sun Photographer Stacks. "I was shooting snow scenes for our Sunday magazine section when I saw this picture possibility on Vineyard Lane.

"Opening the shutter for a time exposure, I ran down 15 feet behind the automobile to the right. There, I fired a General Electric #5 Flashbulb to light the falling snowflakes.

"With shutter still open, I illuminated the house by running farther down the street and firing a G-E #50 bulb 50 feet from the house. Then, to soften the foreground, I ran back and shot another #5 bulb covered with a handkerchief and without reflector from high above camera, then closed the shutter. Total exposure: 45 sec.

"My camera was a Speed Graphic on a tripod. Royal Pan film, lens opening, f/16. This picture has won numerous prizes for me, thanks to reliable G-E Flashbulbs."



GENERAL ELECTRIC PAYS $50.00 upon acceptance of photographs illustrating difficult lighting problems you've solved with General Electric Flashbulbs. Send your picture with a detailed description to: Photo Lamp Dept., General Electric Company, Nela Park, Cleveland 12, Ohio.

GENERAL ELECTRIC

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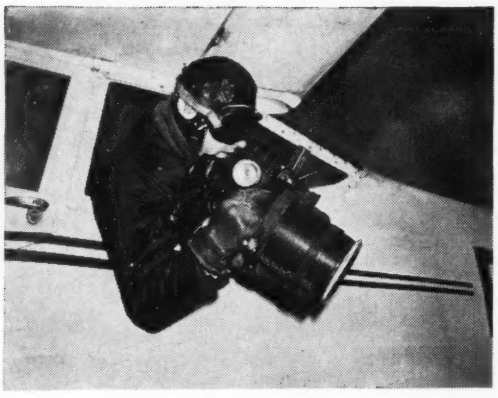


KLM AERIAL PHOTOGRAPHERS are set for action. The photo at the right was taken during the twenties. Below we see a modern plant in Delft, Holland which is equipped with apparatus for making maps from photographs.

King-sized Photo Lab At Royal Dutch

Whether shooting on the ground or in an airplane, KLM's photographic staff turns out an astronomical number of top-flight pictures every year.

If all the photographs in the Photo Department Library of KLM Royal Dutch Airlines were laid end to end, they would stretch 7½ miles. Work it out for yourself: there are about 50,000 photos and their average size is 9½ x 7 inches.

Photographs in that quantity present quite a filing problem; but R. J. Gelink, manager of the Photo Department, located in The Hague, has solved it. More than 40,000 file copies (neatly affixed on cards) and over 10,000 intended for immediate use are stored in a number of four-drawer cabinets. They are grouped under such headings as Airports, Aircraft, KLM Offices, Foreign Countries, etc. Journalists, photographers, publishers, as well as KLM, itself, avail themselves of the files' resources. KLM uses the photos in show window displays, exhibitions and folders, and distributes them to travel agents.

Each month a Photo Newsheet is published. On it are reproduced additions to the files. Each photograph has a number under it for easy ordering purposes. The photo sheet is accompanied by a mimeographed page with captions for the pictures.

Although some photographs are given outright to outside organizations, most are put out on loan. Since people are people and apt to forget what they borrow, each photo bears a stamp reminding the borrower that the photo should be returned in due time.

"Our constant aim is to have the photos made by our own

continued on page 53

TRAFFIC CONTROL in harbors such as this one is made easier with aerial photos.

Avco selects ARRIFLEX®!

THE CHOICE OF PROFESSIONALS ALL OVER THE WORLD

12th in a series

"ARRIFLEX SERVES AMERICAN INDUSTRY"

ARRI

Avco's Research and Advanced Development Division selects Arriflex to record the progress of a data recovery program; another phase in carrying out Air Force contracts to produce re-entry vehicles for the intercontinental ballistics missiles Titan and Minuteman. The photographs show Arriflex cameras filming a test air-drop of an information capsule under development for use in ICBM re-entry vehicles.

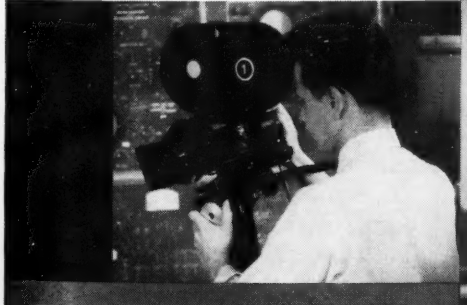
Avco uses no less than six Arriflex motion picture cameras, both 16mm and 35mm. Some are in continuous, around-the-clock use, performing perfectly under the most exacting conditions imaginable.

Arriflex, the world's most ruggedly reliable, money-saving production camera can perform equally well for you!

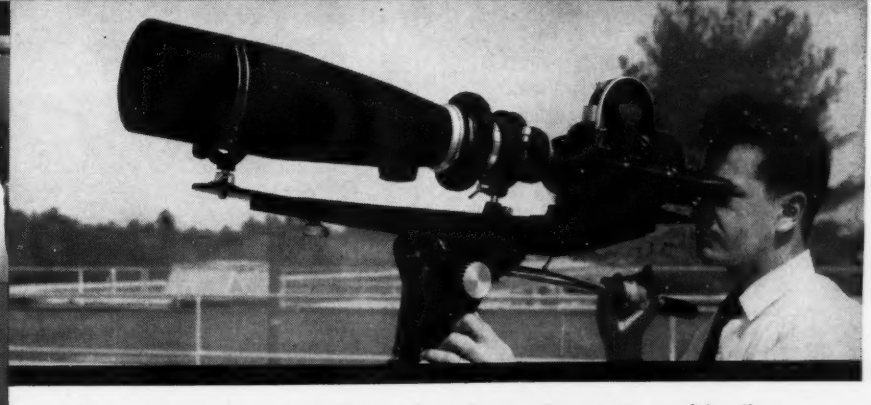
Here Jack Philo, Avco cameraman, uses an Arriflex 16 during "data cassette program" on Cat Island, one mile off Marblehead, Mass. That's a 32 inch telephoto lens mounted on the Arri. Avco cameramen carry the rugged ARRIFLEX wherever they travel in conjunction with this new data recovery development program.

Arriflex 35 and foul-weather gear sported by Jack Philo during one phase of "data cassette program", in which a capsule in a test drop is recovered off Marblehead on the windswept New England coast. During critical experiments Arriflex motion picture cameras are in use 24 hours a day.

Avco camerman Mel Miragliotta checks out telescope and 600mm lens alignment on his dependable Arriflex before leaving for the drop test site off Marblehead. The experiments were recorded from Cat Island, a lobster boat, and a high-flying plane. The one thing all have in common...an Arriflex aboard.



The Arriflex is used in-plant too. Here it is shown photographing new instrumentation in an environment test program. Through these films, the Air Force can evaluate Avco's progress on contracts to produce re-entry vehicles for Titan & Minuteman ICBM's.



Discover the reasons why the motion picture departments of leading companies and professional producers prefer the remarkably versatile Arriflex 16mm and 35mm cameras. Write for complete literature today!

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reel TRIUMPHS

EXPERT TALK . . . Make slide films with accompanying sound for company meetings—let your men with "know-how" do the talking. New products or marketing ideas are explained using color slide films made from transparencies taken with any candid camera. Then simply tape an accompanying commentary by a technician or executive. At minimal cost, you've one or more meetings ready for running at a moment's notice.

MECHANICAL SALESMAN . . . If your company is displaying a complicated diagram or cutaway section at a trade show, let an explanation on "SCOTCH" BRAND Magnetic Tape do the work. At the touch of a button, customers are told what they're looking at—and salesmen are free to make sales and answer additional questions.

IDEA POOL . . . Exchange new ideas and experiences of company personnel across the country. Put them on magnetic tape and mail from branch to branch. Designed for this heavy-duty use is new "SCOTCH" BRAND No. 311 Tape. Its exclusive TENZAR backing is extra-tough, resists tearing, fraying, varying tension and sound distortion. And "SCOTCH" BRAND No. 311 Tape is made by the 3M Company, pioneer and leading manufacturer of audible range, video and instrumentation tapes.

FREE . . . "The Tape Recorder in Business and Industry," a handbook of tested time- and money-saving industrial uses, is yours free by writing Magnetic Products Division, Dept. MCH-40, 3M Company, 900 Bush Ave., St. Paul 6, Minnesota.

"SCOTCH" BRAND MAGNETIC TAPES

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. . . WHERE RESEARCH IS THE KEY TO TOMORROW
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Sipley on Patents

by DR. LOUIS W. SIPLEY, *American Museum of Photography*

A light meter which should be of value to the industrial photographer is described in *U. S. Patent No. 2,917,969,* issued to Kean W. Stimm of Williamsville, N. Y. This is a device which combines the ordinary functions of an exposure meter with that of determining the color balance of the source of illumination. Fifteen, even 10, years ago this would not have been of such vital importance to a large number of photographers. However, the photographer of today deals more and more with color films, both negative and reversal types. The tremendous range of light intensities and color balance of both natural light and artificial illumination make it essential that accurate measurements be made of these two factors. Measurements may be made by incident or reflected light. All readings are made on the face of the meter as held in one hand, manipulations being by the other hand. Two voltaic cells are used in measuring intensity or color; however, a different circuit is used for each.

Patents covering novel electronic flash equipment have been issued to both Harold E. Edgerton and Charles Witterson, assignor to Kemlite Laboratories Inc., of Chicago. The patent issued to Dr. Edgerton, *U. S. Patent No. 2,919,383,* has the object of the provision of new and simplified flash apparatus. As described by Dr. Edgerton, it "comtemplates a flash device having a pair of electrodes inserted with opposite preferably open ends of a normally insulative envelope of cross dimension just slightly larger than that of the electrodes." The Kemlite patent, *U. S. Patent No. 2,917,668,* covers an electronic flash unit which will, at the option of the operator, provide either a low-intensity, almost continuous light for modeling purposes, or a short duration flash of high intensity for the actual exposure of the photograph. A conventional gaseous-discharge flash tube is used in this equipment, the dual uses being made possible by a special circuit.

A United States patent just granted and assigned to General Aniline & Film (ANSCO) covers a method of preventing the fading of the cyan image in their dye-couple color film. The patent, *U. S. Patent No. 2,913,338,* states that the improvement in preservation of such cyan dye image is obtained by treating the film, after the final washing step, with a water solution containing one to 50 grams per liter of a water-soluble salt of a metal selected from the class consisting of calcium, magnesium and cadmium.

Kenneth D. Clardy of Hollywood, Calif., through assignment from Ernest C. St. George, has received *U. S. Patent No. 2,916,977,* covering a camera which combines the photograph of an individual with a picture, taken simultaneously, of a check or other object on the same film. The camera differs from others used for this same purpose, chiefly through its simplicity. The camera is supported on a pedestal, with one lens pointing straight in front of the camera and a second lens directed downward at right angles to the plane at which the front lens is directed. Many industrial uses can be visualized for such a camera.

ROYAL DUTCH

continued from page 50

photographers as often as possible," said Mr. Gelink.

"We need not pay copyright then, and besides, because the negative is in our possession, we can always make enlargements of any size. This is often required. For public relations purposes, the size is mostly 9½ x 7 inches in Europe. This size is also suitable for making reproductions when the negative of the photo is damaged or has gotten lost."

The Photo Department presently is setting up an entirely new filing section for color slides. Right now the demand for these is not very great, but it is expected that it will increase within the next few years.

Most of the photographs for the files are produced by KLM Aerocarto, Ltd., headquartered at Schiphol, where the negatives are filed.

KLM-Aerocarto represents an amazing in-plant success story, particularly in the realm of aerial photography. It started in 1921 as the aerial photography department of KLM. In time it grew from a department into a limited liability company with its own management.

Its aerial survey services have mapped a generous portion of the world's surface, including such 'til-then remote areas as Surinam and New Guinea.

Today KLM-Aerocarto has three Dakota aircraft in use for aerial survey. Each aircraft has a crew of four: a navigator, a pilot, a cameraman and a radio operator or flight engineer.

All told, KLM-Aerocarto employs a staff of 120. In its buildings at Schiphol, many remarkable photographs are on view: photos of cart tracks made by the wagons of the Huns many hundreds of years ago, and which were discovered by archeologists thanks to these pictures; photos of a submerged town rediscovered to everybody's astonishment on a chance aerial photography mission. □

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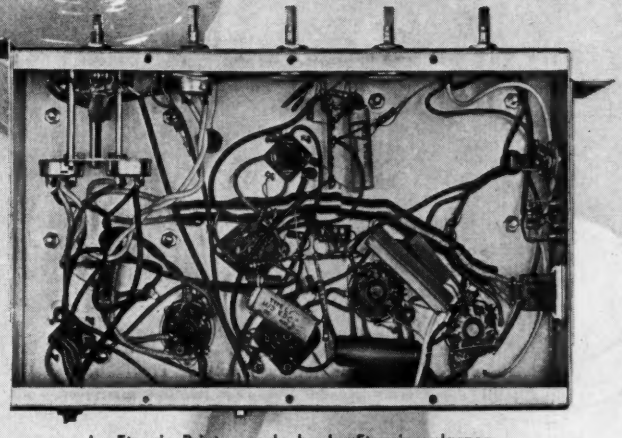

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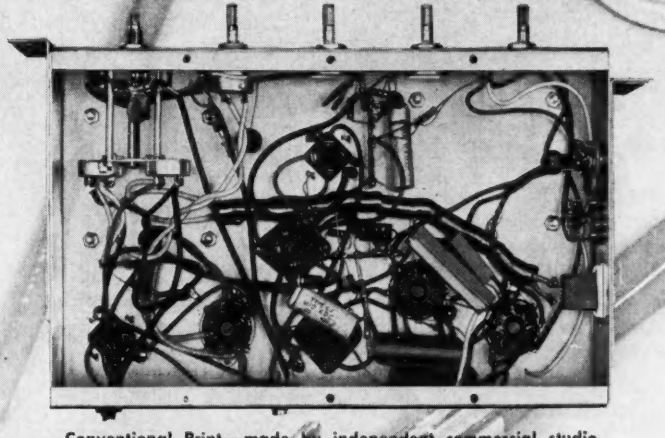

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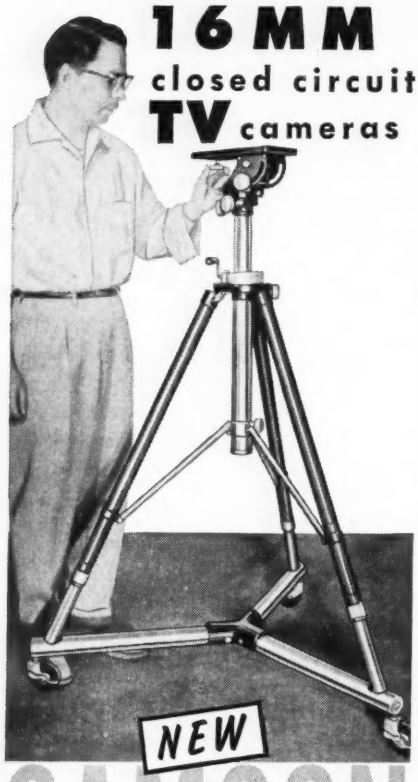

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Color Supplement

In our February issue we published a directory of color processing equipment. It was based on answers to a questionnaire sent by INDUSTRIAL PHOTOGRAPHY to manufacturers across the country.

We were unable to list several responding companies because their questionnaires arrived in our office after we had gone to press. As a service to our readers, we are publishing those late responses at this time.

For full information on any of the equipment listed in this directory, write directly to the manufacturer.

Reel E-Z Corp.
1112 Chestnut St.
Burbank, Calif.

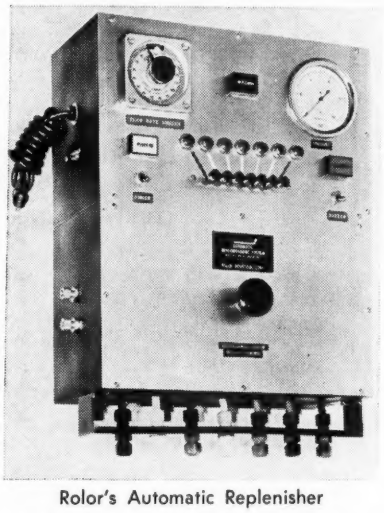
Fully automatic processor which needs only 4′ x 5′ of floor space. Can handle as many as 200 rolls of film at a time, as many as 500 prints. Processes Anscochrome, Ektachrome and Kodacolor films, and Printon, Ektacolor or type "R" prints. Converts in five minutes from one to another.

Rolor Industrial Corp.
18 East 42nd St.
New York 17, N. Y.

Manual and automatic units. Most models handle Ektacolor Print Film as well as paper. Manual models can be furnished with Rolor Automatic Replenisher. Automatic temperature control is an integral part of each unit. Nitrogen burst equipment—injection type—is integral part. All necessary plumbing pre-fitted, requiring only attachment to water and electrical lines. Will build to specifications. Some units handle roll paper (20′ lengths, 8″ wide). Units are made of Type 316 stainless steel, heli-arc welded.

Model 35-5 Rolor Color Print Processor is 55½″ wide, 28″ F to B. Capacity: 16 x 20 prints. Other sizes accommodated. Paper: 8 x 10 thru 16 x 20. Film: 8 x 10 thru 16 x 20. Fluid solution capacity of tanks used: 3½ gals. Price: $2795.

Model CL-1 Rolor Color Laboratory is 62″ wide, 35″ F to B. Capacity: 16 x 20 paper, 8 x 10 sheet film, 35mm film, 120 roll film. Paper: 8 x 10 thru



Rolor's Automatic Replenisher

16 x 20, quantities based on baskets used. Film: 4 x 5 thru 8 x 10 sheet, 35mm, 120 roll. Fluid solution capacity of tanks used: 3½ gal. paper, 2 gal. film. Price: $3495.

Model PF-1 Roll Paper Color Print Processor is 57½″ wide, 19″ F to B. Unit's capacity: 8 x 10 prints. Paper: 2¾″ thru 8 x 10. Same for film. Fluid solution capacity of tanks used: 3½ gals. Price $3775.

Model 24-10P Rolor 20 x 24 Color Print Processor is 88″ wide, 38″ F to B. Unit's capacity: 24″ x 36″ prints; other sizes accommodated. Paper: 8 x 10 thru 24 x 36. Same for film. Fluid solution capacity of tanks used: 10 gals. Price: $8995.

Model Pro-10-Color Print Processor is 104″ wide, 28″ F to B. Unit's capacity: 16 x 20 prints; other sizes accommodated. Paper: 8 x 10 thru 16 x 20. Same for film. Fluid solution capacity of tanks used: 10 gals. Price: $4950.

continued on page 96

INDUSTRIAL ROUNDTABLE

continued from page 10

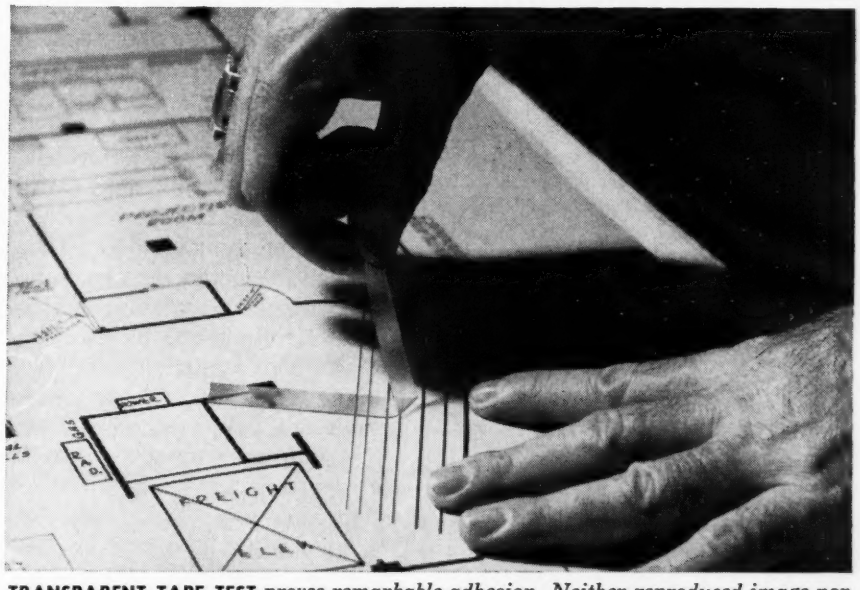
It has been my experience that many industrial photographers work and live in isolated areas, seldom coming in contact with other photographers; their only contact with the outside photographic world generally being a technical representative from one of the photographic manufacturers. These people are wonderful and do an excellent job but their purpose in being is mostly to push their own product. The photographer, therefore, gets a slanted viewpoint and, regardless of how important this technical man may be in the world of photography, he doesn't supply all the answers.

To supplement this type of contact is the reason for the Miami Conference. Speakers from all over the United States and Europe are invited. It is our boast that we invite the top people and spare no expense in bringing them to Miami.

They argue with each other and with the conferees. This is good, for out of discussion and argument comes ideas, and this is the most important asset the photographer has—more important than his technical knowledge by a long shot.

The speakers are editors, photographers, art directors and writers who work with photographers. This year's keynote speaker is Dan Mich, editorial director of Look. Other speakers are famed Margaret Bourke-White; Pierce Fredericks, associate editor of The New York Times Magazine Section; Harold Blumenfeld, executive editor of United Press International Photos; Mark Strage, editor of American Cyanamid's publications; Merrick Jackson, editor of Steelways; Milton Greene, famed fashion photographer; Bill Reedy, editor of Eastman Kodak's Applied Photography; Bruce Downes, editor of Popular Photography; Beaumont Newhall, director of the George Eastman House; Dr.

REPRODUCTION TRENDS



TRANSPARENT TAPE TEST *proves remarkable adhesion. Neither reproduced image nor added ink lines can be pulled by tape from* POST *"wash-off" reproductions. They will not rub off under any circumstances. But, a moistened eraser will remove any reproduced detail or section instantly.*

"Wash-off" reproductions preserve originals

Many reproduction departments are turning to newly-improved POST "wash-off" cloth or film to rejuvenate old originals or to duplicate new tracings. And, in addition to serving as duplicate masters, two recent improvements in coating give excellent image adhesion and shelf-life up to 12 months—an extraordinary development compared to other formulations.

Easy to process:

POST "wash-off" materials may be handled in normal room light, are exposed to a strong light source with a suitable negative. Printing speed is consistent, due to the long-life coating. After exposure, preferably under a vacuum frame, wash with water, then swab lightly to remove the unexposed emulsion. Following tray development with POST 227B Developer, wash and swab again before air drying. No need for delicate handling or for a fixer.

Superior reproduction:

With POST "wash-off" reproductions, the image develops in sharp, black relief—making it difficult to distinguish between the contact image and an added ink line. For print-back quality and working characteristics, these reproducibles are the equal of ink cloth drawings. But, durability of the reproduced image does not hinder its removal with a wet eraser. The surface readily accepts pencil or ink, even over erased areas.

Unique new shelf-life:

The locked-in image cannot be rubbed off, blurred in storage or handling. Forced aging has no appreciable effect on image or base. Most outstanding is the phenomenal shelf-life, up to 12 months, prior to exposure, an exclusive feature with newly-improved POST "wash-off" materials. Available in standard length rolls with widths of 30″, 36″, 42″ and 54″ on white or blue-tinted cloth, 100% rag vellum, or dimensionally stable film.

For more facts about POST *Reproduction Cloths, Films and Papers, write to Frederick Post Company, 3662 North Avondale Avenue, Chicago 18, Illinois.*

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Wayne Miller, who worked with Edward Steichen in organizing the Family of Man exhibit, will speak on the subject of photographic books; Ralph Morse, versatile Life photographer, will speak on what he's renowned for—versatility; and Wilbur Garrett will tell about the change in the National Geographic Magazine. Garrett is one of their top editors and photographers.

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See you at the Miami Conference. □

LOW-COST COLOR

continued from page 38

the total cost is many thousand dollars less than the complete "unitized" processors generally available. In addition, this installation offers other important advantages besides low cost.

When the lowest possible cost is desired, or available space is at a premium, both requirements can be satisfied by a more modest eight-tank installation. This utilizes only one wash tank and one sink, thereby saving the cost of three wash tanks, a sink, and four plumbing outlets. This eight-tank arrangement will be entirely satisfactory for users starting out with limited production requirements. Later, when volume grows, the extra wash tanks and dark sink can be added to complete an installation as pictured above.

Perhaps the most important advantage of the 10-gallon installation is its system of solution temperature control. The most common means of control in photographic practice has been through the use of water jackets. While serving the purpose admirably in smaller installations, this method proves to be disadvantageous in 10-gallon color systems because of the large volume of water required to effectively jacket the many tanks used. This water may weigh 500 pounds or more, and each time a temperature error exists, this entire mass must be first either displaced or adjusted before effective readjustment of solution temperature takes place. This is time-consuming and wasteful.

As will be seen from the installations described, no jackets as such are recommended; only shallow sinks mounted on a low stand are shown, and these are for the purpose of draining off wash water, used chemicals and drippings—not temperature control.

Instead, temperature control is provided by a standard room air conditioner with thermostatic control, which provides operator comfort as well. This feature results in the most significant saving of all. For the full-height water jackets used in conjunction with unitized processors amount to a major portion of their cost. A thermostatic water mixer is shown in this installation, but it is used to control the temperature of wash water only.

Dispensing with the water jacket also results in other advantages: Off-temperature wash water cannot upset solution temperatures as it does in unitized processors, where the wash water empties into the jacket.

It is also impossible to use "quick-dump" type wash tanks in the jacketed unitized processors without tying their drains directly into the main drain. This drain system is much more costly than the simple dump valves that can be used in the system described; it makes removal of wash tanks difficult or almost impossible; and

it offers no increase in production in return for its additional cost.

Cleaning is also a simple procedure with the installations described. Drippings from baskets being transferred will fall into the sink, where they are easily flushed away. □

TECH TRENDS

continued from page 16

This process, in essence, closely resembles the recording of pictures on magnetic tape with the picture being recorded line by line, horizontal sweep being provided by the moving electron beam instead of the rotation of the recording head, and vertical sweep being provided by the movement of the recording tape.

Since a beam of electrons is used to produce the change in the recording medium, the film must be handled in a vacuum and the prototype equipment takes about one minute to pump down from atmospheric pressure to a vacuum low enough for effective operation.

Reconstituting the Picture

The picture recorded in ripples in the thermoplastic coating of the film is made visible by projection, using a simple Schlieren optical system. This system uses a light source consisting of a number of lines which are imaged on a set of bars in front of the projection lens. With no film in the gate of the projector no light will reach the screen, but when a film bearing ripples on its surface is placed in the projector, these ripples will scatter the light through the system of bars and be imaged on the screen as a white area.

A similar, though rather more complex, projection system has also been developed which permits the projection of pictures.

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methods employed in recording on thermoplastic film, it is possible to see the advantages of the system and to make an attempt to see some of the disadvantages. Then it should be possible to forecast some possible areas of usefulness.

Thermoplastic recording is superior to magnetic recording in that it can already concentrate in a given space around 100 times as much information; it is almost equal to magnetic recording in the speed with which the information can be read out after recording; it is superior to magnetic recording in that the information, if it is in the form of a picture, can be made visible by simple equipment; it is the equal of magnetic recording in that the tape can be erased and re-used.

Thermoplastic recording is superior to photographic methods of recording in that it does not need chemical processing and is consequently much faster in processing; it is equal to photography in storage capacity and gives equal quality if pictures are being recorded; it needs much more complex recording equipment than photography.

Thus, where simplicity of equipment is a primary consideration, it would seem that photographic methods of recording are unlikely to be superseded by thermoplastic recording. A second, though minor, disadvantage of thermoplastic recording is the natural result of using specular light sources in projection — dust will show up as white on the screen just as well as the ripples which form the image.

Making copies of a thermoplastic recording would appear to be of about the same order of difficulty as making copies of a magnetic recording, and in this respect the system compares rather unfavorably with photographic methods.

Summed up, these conflicting merits and demerits would seem to indicate that thermoplastic recording is most likely to be useful in recording binary data in such applications as computers, where the problem of dust can be readily overcome and the advantages of fast recording and readout are important; additionally, in this application the facility with which data can be erased and replaced is likely to be an advantage.

For television picture recording, the thermoplastic system looks as though it will have useful possibilities, permitting simple editing techniques and re-use of the film by erasure. Here, too, the simple raw material will be an advantage.

For amateur and professional motion pictures, the thermoplastic recording system seems to offer few, if any, advantages over photography, and has the disadvantages of expensive equipment for recording, with multiple copies costing as much as original recordings. □

SHOP TALK

continued from page 20

Enhancement" by T. C. Leighton. . . . Professional Photographers of California held their fourth annual symposium and featured a business management seminar. . . . Medical photographers from the midwest and Canada met in Milwaukee for the second Midwestern Sectional Meeting of the Biological Photographic Association. . . . Plant tours were the order of the day for New York's SRE chapter (to Chas. Bruning Co.), for Pittsburgh's "Photographers in Industry" group (to Tecnifax Corp.), for the Chicago's SPSE unit (to Rand McNally), for Atlanta's SRE branch (to Recordak Corp.), and for Houston's SRE section (to Tennessee Gas). □

For a copy of our soon-to-be-available instrumentation index write on company stationery to Industrial Photography, 10 E. 40 St., N. Y. 16, N. Y.

RECORDING UNSEEN

continued from page 26

angle some bands were nearer to the camera lens than others and, of course, could not be measured or their course examined one against the other. Also closely placed lines appeared as one. It was, therefore, realized that the bands must be placed at right angles to the lens if they were to be recorded at all. The petri dish was then positioned horizontally, and scattered reflected oblique light rays were passed upwards through the specimen. Thus, the same results were obtained as when viewed obliquely.

The petri dish was placed on a piece of plate glass some 15 inches above the base of a macro camera. Direct oblique illumination was used, incorporating a 500-watt photo flood lamp. The results were disappointing, and from day to day, slight variations took place in the setup. The height of the specimen from the base was frequently altered, the angle of the light was often changed and its distance from the specimen also varied. Various reflectors were incorporated, (all being supported by retort stands and clamps) until a true record of the bands was made. The present arrangement as illustrated in *Figure 1* was designed from that described above. This high-intensity light caused the agar to appear to be completely transparent, owing to the direct light passing through it, but agar is translucent. This media caused the light rays to be absorbed and many rays scattered sideways, hence the reason for shadows being cast from small particles of foreign matter within the agar. In addition to this, the scattered rays of light struck the bands at all angles, illuminating them within the gel layer, and were only seen when the medium was placed above a black background. □

(The final steps leading to a successful technique will be described in next month's Science and Instrumentation column.)

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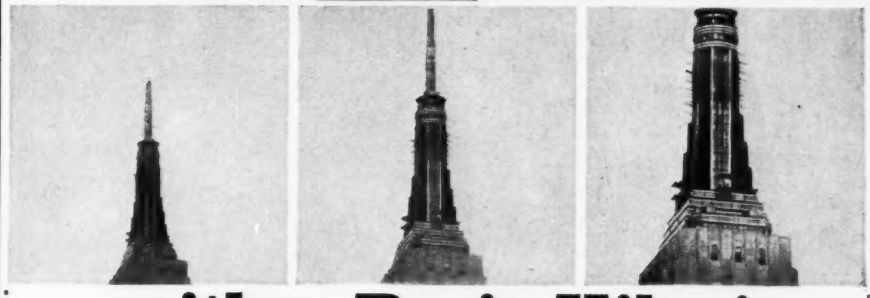

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Electronic Flash

by HARRY PARKER

Electronic Flash Isn't "Different"

Questions from photographers indicate that they consider electronic flash a light source that is "different" and subject to some special mysterious rules of use. Without in any way minimizing the many wonderful characteristics that make it a useful light source, electronic flash is still just another light source. All the rules of light still apply and all the tricks of control that you have used or have been using are still effective. By thinking of electronic flash as just another light source and understanding basically light and light control, you will be freed of some restrictions and can then use it easily, as it should be — as a tool in creating your pictures and as a means of helping you express your artistry.

Electronic flash equipment has been developed to the stage in which there are light units available, capable of giving almost any quality of light source that is desired. Practically, you should learn your own equipment. Direct your light sources one at a time against a blank wall and take pictures both with the modeling lamps and with the flash. Learn what *your lights* will do in regard to spread and coverage, sharpness of shadows, and strength. Once you know your own lights, you will be able to use them more effectively.

What are the basic factors of light that concern us photographically? They are: **1)** Strength, **2)** Color Balance and **3)** Direction.

Strength

There are several different theories as to the exact nature of light. For our purpose, it helps to think of light as radiated energy that sprays out of the light source as small minute particles, each particle being a definite amount of light or energy. The number of particles coming out of the light source is determined by the strength of the light source. We can call these particles "lumens". By definition, a light of one candle power strength that is emitting light evenly in all directions will put out one lumen per square foot at one foot distance. If you analyze this, you will see that one candle power light source radiating in all directions will produce a total of about 12½ lumens;
($4\Pi r^2 = 4 \times 3.1416 \times 1 = 12.5664$)

The amount of light that gets on a given area depends upon the way the direction of these particles are controlled. If the light source is emitting the light or radiating energy particles evenly in all directions, the number of particles or lumens per square foot will vary inversely as the square of the distance. This is the basis of the "Inverse Square Law" and the basis of "Guide Numbers."

When some means of light control is used, such as reflectors, lenses etc., to concentrate or direct the lumens onto a given area the strength of the light in the desired direction is changed and we have the need to define the strength of the light in a particular direction; hence, the use of such terms as *Beam Candle Power*. This simply means the candle power strength of the light on the beam. Other terms such as *Horizontal Candle Power* (HCP) are sometimes used for special purposes. In photogra-

continued on page 68

LIGHT SOURCES

continued from page 25

diameter drum camera to record Schlieren photographs. A 500-microsecond delay between sparks was used in typical tests, thus permitting a one-inch image when using a maximum drum speed of 2400 inches per second.

Evaluation tests were made using a shock tube to accelerate air, initially at atmospheric pressure and temperature, to a speed of 1800 feet per second. Schlieren pictures were taken of the air flowing from the shock tubes over a slender cone placed in the stream (Fig. 2). A delay time of 200 microseconds was used between sparks in order to photograph the flow field. Variations in the flow can easily be seen by comparing the exposures.

The spark source was triggered by a pressure transducer which was excited by the pressure behind the incident shock wave. An initial delay prevented the first spark from firing until the shock was visible at the end of the tube. Then the sequence of sparks was fixed at preset intervals and the results photographed with a rotating drum camera.

During periods of high ambient humidity, system reliability was greatly reduced. A satisfactory solution was found by placing the unit in a fairly tight metal enclosure containing desiccant bags. The metal enclosure keeps the high voltage spark discharges from interfering with other sensitive instruments.

The flexibility and performance of this light source system at CAL approaches and in some cases exceeds that of systems using expensive source-shutter combinations or high-speed cameras and its general reliability recommends its use. Most parts are standard but even special parts are relatively inexpensive. □

CO-AUTHORS Merle R. Wilson and Richard J. Hiemenz are both associated with the Cornell Aeronautical Laboratory. An expanded version of this article originally appeared in *Research Trends*.

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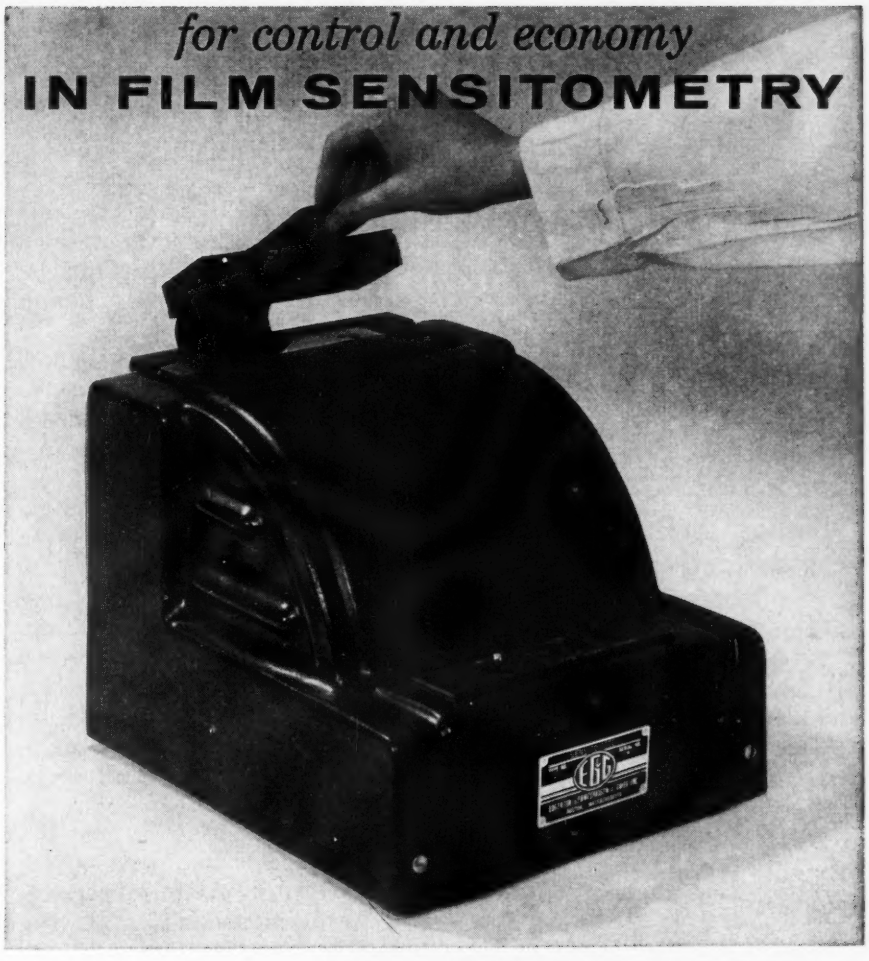

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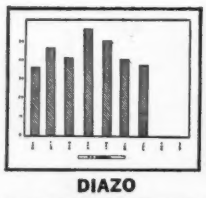
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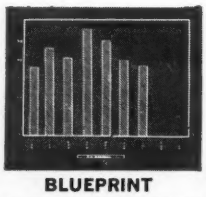
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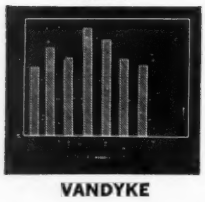
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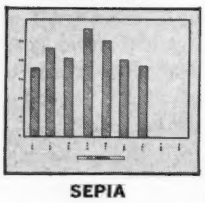
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REPRODUCTION MANAGER

continued from page 8

lowed by a five-minute wash in running water. This is permanized by fixing only and results in a slight loss of density in the trace. If you use this method, never leave the record in the fixer more than the recommended time, because the entire tracing could be obliterated.

There are four effective ways to reproduce tape records: by a machine manufactured by the Reproduction Equipment Company of Dallas, Texas, by diazo, by photochemical reproduction and by Photostat. The machine makes suitable copies. Photostat is also excellent for reproducing negatives or positives of the original tapes.

Most reproduction laboratories will probably use one of the other two methods instead because of initial costs.

Diazo. Direct printing through the diazo machine can be done with success, providing the tape has not been smeared or smudged and providing exposure in the printing chamber is adequate to bring out the trace's fine detail.

The tracing has to be printed at a faster-than-normal copying speed to bring out the fine detail. In some cases, the reproduction may have more background density than desired. But, all in all, the diazo should provide you with adequate reproduction.

If only a small section of a long tape has to be reproduced, a translucent master may be made for reproduction by diazo, which provides the maximum quality for this type of reproduction. This can be done by using a translucent autopositive material or by making a contact negative first and then a translucent master. The latter method is desirable when the original is smeared or smudged and you want to produce a clean reproduction.

Of course, use of a translucent master raises the cost of reproduction. But if the reproduction is going to be used where maximum legibility is required, the employment of this method may be necessary.

Photomechanical Reproduction. This method is more expensive than diazo but produces the finest reproduction. Filters are used to remove background color on the original graph paper, thereby producing a clear, sharp reproduction. Fine-line developing techniques can also be employed to maintain maximum image sharpness.

A useful technique for reproducing portions of the original tape is to photograph the original in sections, employing a fairly large reduction. Strip the negatives together and then print the multiples on each page. The advantage of this is that the desired information from the original can be distributed in page form without inclusion of irrelevant information.

One word of caution when employing photochemical reproduction: since the material you are reproducing may have a colored background and in some cases low image densities or insufficient contrast, you must be accurate with the camera exposure. Don't hesitate to use filters to provide greater separation. □

TRADE SHOW

continued from page 48

show is being set up. Again, management permission is necessary in order to shoot before the show opens. Let me give you fair warning: You'll be obliged to work around crates, carpenters, drapers, freight handlers, janitors, and anyone else wandering by.

A disadvantage of shooting after hours is that it runs into overtime for electricians if their services are necessary to set up lighting or lay special lines. However, you may be able to plug your lights into a junction box that is part of the display and

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continued from page 12

plified image of the film to aid in establishing coincidence of the measuring reference with the measured object. This latter can be done by placing the measuring reference at the film plane and moving the reference with respect to the film or placing the measuring reference in the optical axis and moving the film with respect to the optical axis.

Limitations of commercial optical components dictate that the measurement operation be performed before amplification in high accuracy readers. Consideration of the measuring methods available, therefore, is in order. At present, the most acceptable and proven method for automatic readout from a linear measuring device is the use of digital, shaft position encoders. The use of the shaft position encoders in linear measuring systems requires that some radically new method of motion conversion be employed. The two most conventional methods for this conversion are rack and pinion or belt and pulley arrangements. A leadscrew and nut are considered to be a special form of rack and pinion.

Semiautomatic, high precision film readers with motorized, optical measuring engines and automatic readout are fairly satisfactory as medium speed, high accuracy readers. Such readers are capable of accuracies to two or three microns and exceptionally sharp photos can be measured to one micron. However, the proven need is for more efficient, high production, high precision readers and research is being oriented this way.

It is almost certain that in the not too distant future, fully automatic film readers will be available for some types of data in which the process of recognizing the object to be measured does not require the full complex range of signal to noise discrimination of which humans are capa-

continued on page 84

The unique combination of a prism and rotating-disc shutter in the Photo-Sonics 16mm-1B motion picture recording camera lets you freeze movement in its tracks. You get extremely high resolution from 12 to 1000 frames per second. Prism and shutter disc turn in synchronism with continuously moving film, providing image compensation and even exposure over the full frame. There's no image smear, common with other prism cameras.
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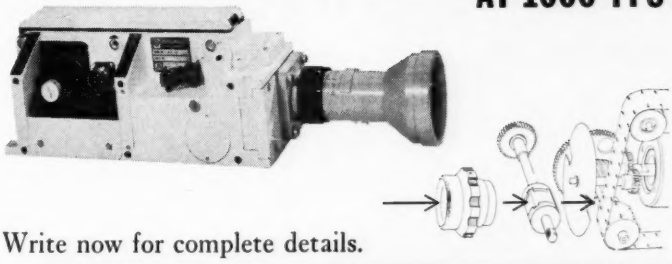

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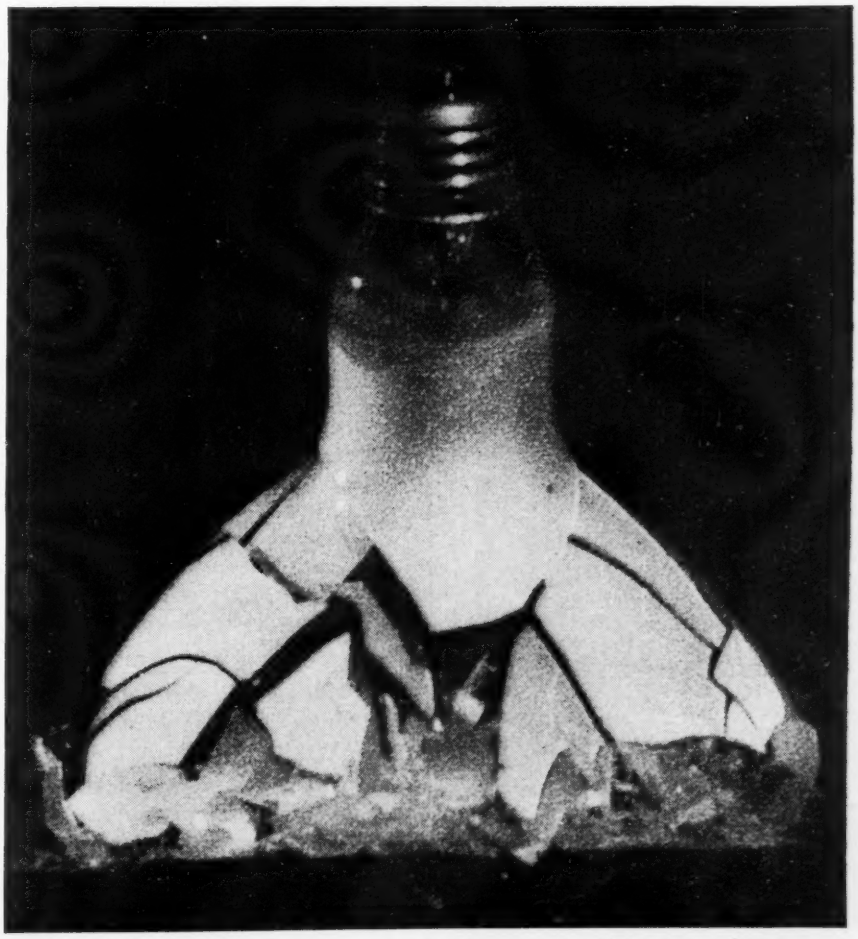

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MOVIE CLINIC
continued from page 18

colorful tree decorations were a natural subject. The color reproduction was again quite faithful, even to the intermittent color effect due to twinkling tree lights in the vicinity.

Another test involved the use of daylight film at 5:00 P.M. on the shortest day of the year. With normal processing, exposure was accurate and color rendition was good. In fact, it was quite startling to see the instrument panel inside a car stand out due to illumination by the dash lights.

In one test, we even went so far as to shoot an interior close-up of a man's face illuminated only by the light from a match as he lit his cigarette.

Tests under fluorescent light, using the daylight film, were rather inconclusive. Exposure in all cases was adequate, but the need for filtering was often indicated. The variation of color temperature of various grades of flourescent light made results vary from good to unacceptable. In this use, tests should be made to determine the proper filtering required for accurate color reproduction of the particular area involved.

A final series of tests included a 400-foot roll of tungsten film taken in a downtown store under existing light conditions. The results of this can only be truly described as "fantastic." Colors were faithfully reproduced, skin tones were completely natural, and the grain appeared insignificant.

Other features of these films include the ability to intercut with Commercial Ektachrome for duplication with only a slight difference noticeable due to the increase in graininess. Color balance is relatively uniform, and the slight differences can usually be compensated for readily in standard scene-to-scene color correction printing.

Another feature of these films is the latent image edgenumbering employed on all footage of this emulsion. Latent image numbering permits accurate "print through" coding of work prints, which will eliminate the sources of error sometimes encountered with "print on" edgenumbers. □

TECH MOVIES
continued from page 36

made as full scale productions, took as long as six months to produce. Consequently, by screening time they were stale and uninteresting, even though of excellent quality.

Now the in-plant film making group at IBM has developed new techniques which enable it to produce a complete film, with synchronous sound, in two weeks. Current and timely subject information is disseminated among engineering groups throughout the company within a month. This keeps engineers in close touch and keeps management, patent people and other interested parties abreast of the latest developments.

One shortcut is the "you are there" approach to making films. Equipment is moved right into the laboratory and the engineer shown close-up with his equipment, rather than simulating laboratory conditions.

Each film lasts about 20 minutes and contains seven to ten subjects. After selecting a subject, script writer and engineer work hand-in-hand to plan the presentation. Rehearsals are not held because they tend to make the engineers nervous and stiff. Avoiding rehearsals also gives the films a journalistic, on-the-spot mood.

Since filming is done in the project areas, careful control of shooting time and high-quality, dependable equipment are essential. The camera is a single-system Auricon Super 1200 with a ground-glass focusing system which permits focusing through the lens for close-ups. Thus, an-

other saving in producing these films is the single-system technique which is used. With DuPont High-Speed Rapid Reversal Motion Picture Film 913A, sound and picture are shot at the same time, and in such a way that it is possible to cut and edit the film and still have picture and sound synchronized.

In a typical film one subject may have as many as eight scenes. Action is planned with a transition beween each scene to allow for editing. The camera crew consists of a cameraman and writer/director who may also operate the sound equipment. If he doesn't take care of the sound, a third person handles this equipment.

Editing is just a matter of splicing the good takes together to achieve a complete picture with sound. A Pan-Cinor lens attachment allows continuous movement from a wide-angle shot at 17mm to a telephoto shot at 70mm, while maintaining focus. This type of shot is visually pleasing and permits a close look at details.

The engineer explains each point by using charts, blackboards, oscilloscope displays and models. The prepared script is only a guide and he does not necessarily use its exact wording. Simple animation techniques are devised to explain internal machine operations. The whole process — script preparation, discussion, setting up and shooting— rarely takes up more than four hours of an engineer's time.

One sidelight of the technical film program is the development of a unique projection cabinet which was built in an IBM model shop. A busy executive can set aside 20 minutes when he is free to view a motion picture and needn't worry about borrowing a projector or screen. Instead, he goes to a room with the cabinet, lifts the lid and turns a switch to activate the machinery. The film is projected on a screen inside the lid and the picture can be turned on or off as the viewer wishes. □

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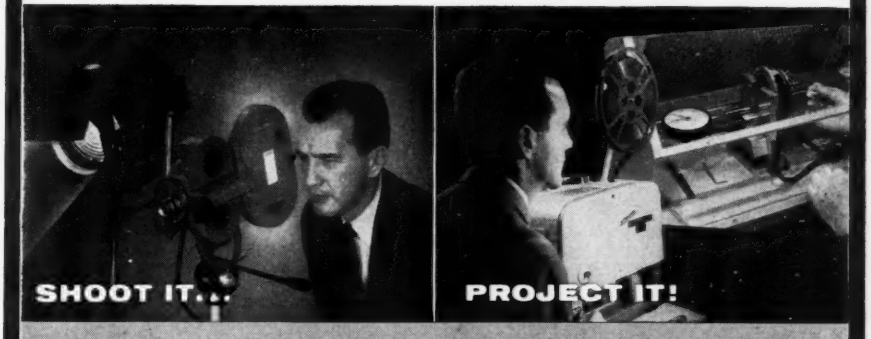

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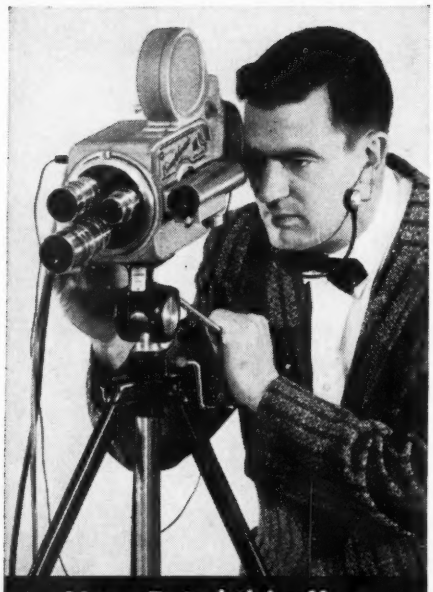

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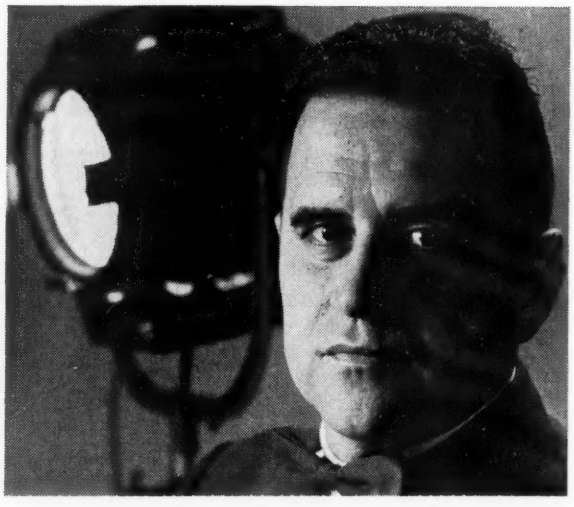
Dick Kinstler seldom uses a camera at P&G



A plaque, not yet dusty from hanging on the wall, sits in Dick Kinstler's office. It bears his name and reads: "For your outstanding devotion and service to the elevation of the standards of industrial photography." The plaque was given to Kinstler in January by the Industrial Photographers Association of America, a New Jersey PP of A affiliate, when the group named him as its Industrial Photographer of the Year.

Dick Kinstler is worthy of this accolade — he set up a central photo lab at the Procter and Gamble Company in 1946 and has headed it ever since. When organizing the department he admits that he had some trouble selling management on the purchase of extensive equipment. However, the company's understandable fear of excessive expense when launching the department has been allayed with Kinstler at the helm. His dollars-and-cents philosophy: "Only if an activity or innovation can be justified on an economic basis will it be adopted."

He explains that P&G's photo department operates as a business within a business. Cost, including all overhead, is charged back to the customer (each department) each month so that his department has no expense budget. "Photography as we use it does not cost money but it saves money," he says.

Kinstler was originally hired by the company as an industrial engineer but later was assigned to organizing a photography operation. Today he supervises 20 employees who work in three photographic and reproduction departments. These departments — all carrying out technical and research assignments — are scattered over a 13-mile area from the main plant. Serving mainly as supervisor, Kinstler seldom gets behind a camera and is kept busy shuttling back and forth between the three centers.

Lab Does Instrumentation Work

Although his operation "runs the gamut of industrial photographic applications" the emphasis is on technical and instrumentation work. Seldom do his men get into the public relations or advertising end of photography.

When asked what training best equips men to become industrial photographers Kinstler answers "I'm all for on-the-job training

with a liberal arts education beforehand. Unfortunately most straight photography courses today fit young people for photojournalism or advertising photography rather than my field." He also advocates that a photographer anxious to enter industry be in business for himself sometime during his career.

Kinstler's background is an example of what he is talking about. He became interested in photography at the age of 15 and free-lanced for local newspapers. Later this led to a summer job as relief cameraman for the local daily newspaper. In 1938 he was partner in a commercial photography studio and from there joined Wright Aeronautical Corporation as junior metallurgist.

During World War II he headed a staff of five men in an experimental photo lab who were given the assignment of recording progress in the development of underwater detection devices. After the war he received a BA at the University of Cincinnati.

Not content to put in eight hours a day supervising photographers, his spare time is taken up with such activities as writing a scholarly thesis titled "The Role of Functional Photography in Industrial Communications" and presenting papers on technical photographic applications to professional groups. An energetic speaker, he is much in demand around the country and has spoken before hundreds of photographic organizations. He was on the staff of the Industrial Photography Management Seminar at the Winona School.

Only a sense of humor and affable personality keep Kinstler on an even keel during his peregrinations around the country and the carrying out of his numerous activities. He is married, with three sons, and lives in Cincinnati. Richard C. Kinstler is one of the growing breed of men on whose shoulders rest the responsibility for running photo installations in multi-million dollar companies. □

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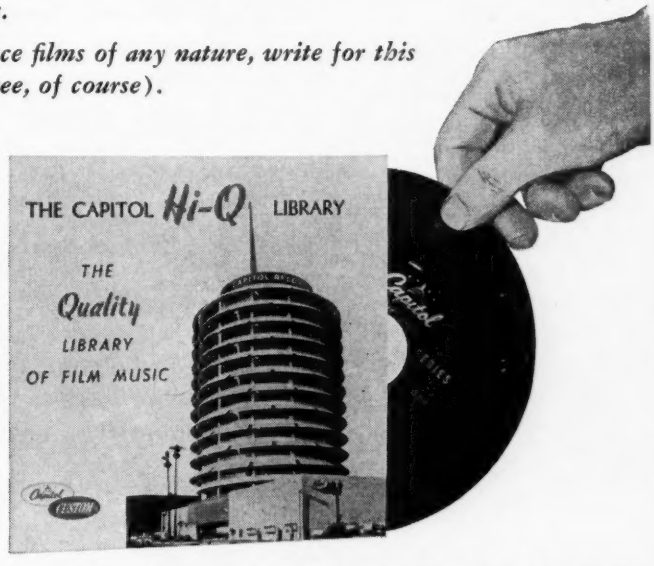

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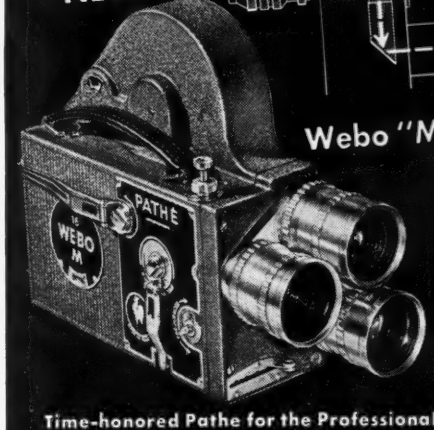

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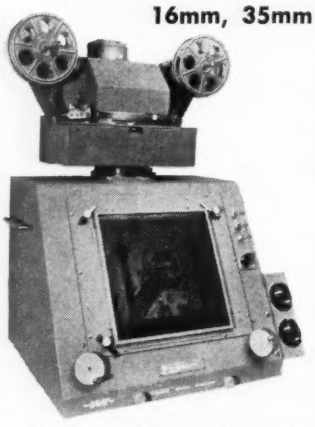

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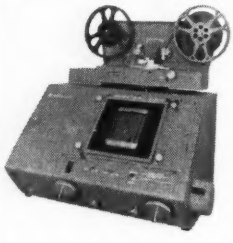

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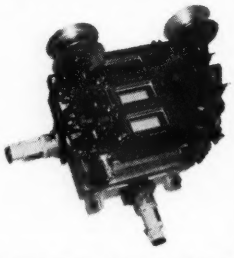

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TOMORROW'S LAB

continued from page 33

Another time and moneysaving step is the rejuvenation of color film bleach — one of the most expensive processing solutions. Normally this bleach is used and dumped. At Canaveral it is rejuvenated and used indefinitely.

The machinery — designed, built and installed by the Houston Fearless Corporation — can be altered to permit change-overs to other processing systems, should they be required. In many instances, duplication of material has been avoided by using one common solution in several machines.

G. M. Powers, manager, RCA photographic laboratory, emphasizes that performance, not size, is the significant feature of the new installation.

He sums up the purpose of the machinery in these words: "Of course the new processing machinery increases our efficiency per man-hour expended, which is highly desirable. Even more important, however, is that we will now be able to give more dependable and somewhat faster service to civilian contractors and military agencies testing missiles on the Atlantic Missile Range." □

ELECTRONIC FLASH

continued from page 60

phy, our exposure depends on the total light. Therefore, we add the element of time and get such terms as *Beam Candle Power Seconds* (BCPS). This is the term we use for rating electronic flash units. This gives the strength of the light on the beam of the reflector. For instance, 2000 BCPS is the strength of the light on the beam and is equal to a light source of 2000 candle power acting for one second. For those so inclined, it

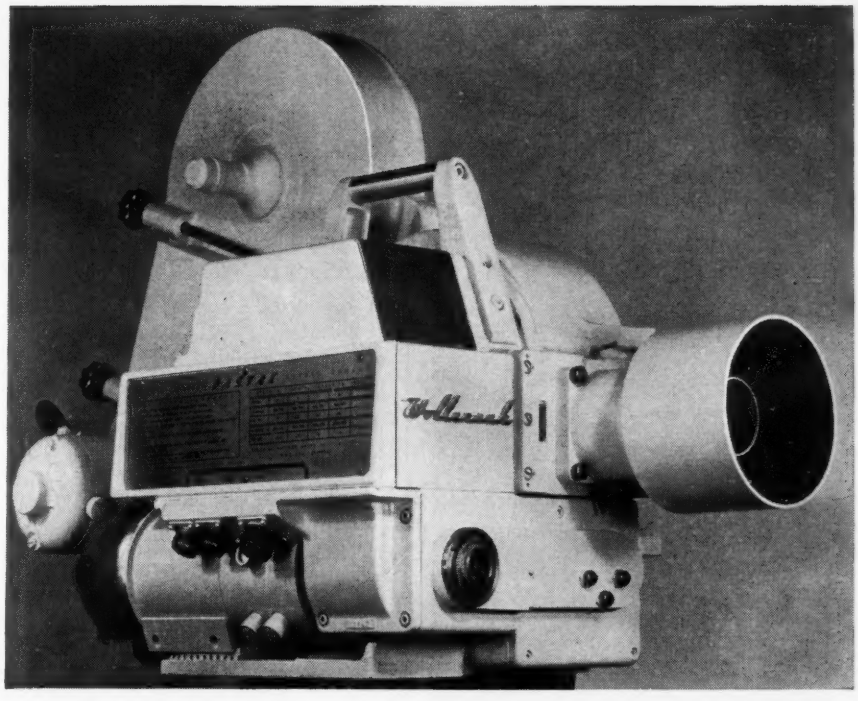
provides the means of comparing the strength of light sources. For the practical photographer, it helps in planning lighting setups and to determine the way to do a job. Remember, if you need to stop down, cover larger areas or cover larger distances, you will need more power with electronic flash just as you do with any other light source.

Another important characteristic of light is *color balance*. This means the presence or lack of energy at the various wave lengths (colors). The relationship between the various colors is approximately defined by referring to the radiation of a "blackbody" at degrees Kelvin temperature. Thus, a light source with a color balance of 3200°K is supposed to have the same balance as a blackbody heated to 3200°K. Mean noon sunlight at the Washington latitude is commonly described as 5400°K. Electronic flash has a color spectrum closely approximating that of daylight. Any slight difference of balance is easily adjusted by filters. For practical purposes, consider electronic flash as daylight light source with all the colors. With filters you can adjust the balance to work with almost any emulsion.

Consideration of the direction that light particles travel is extremely important in the intelligent control of light. There are a few basic thoughts that will help in using any light, including electronic flash: **1)** Light travels in a straight line. **2)** When light strikes a surface, the angle of reflection equals the angle of incidence.

These thoughts lead to the recommendation to think of controlling light as if you were playing billiards. The use of reflectors, bounce boards, mirrors, etc., are examples of "playing billiards" with light. Don't just blast away with light. Control it — put it in the "side pocket" — put it where you want it to do what you want it to do artistically.

(Mr. Parker will conclude his discussion in June.)



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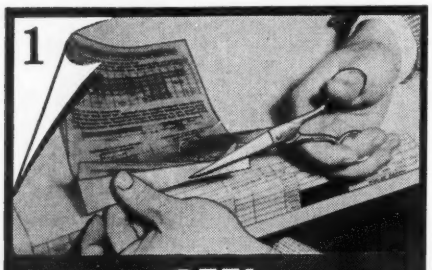
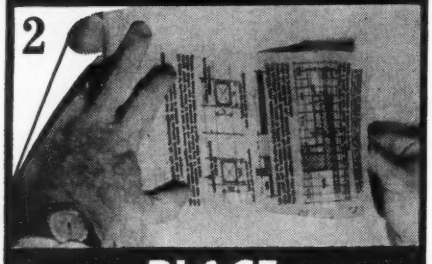


PEEL
the STANPAT from its backing.



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PRINTED CIRCUITS

continued from page 40

working with pencil and ink originals since it provides even illumination over the entire image surface. However, many originals today are now done with tape which raises a problem. The thickness and crepe texture of the tape causes irregular reflections of light which result in streaks of exposed silver on the negative. If permitted to remain, these streaks can cause irregularities in the final printed circuit board. One way of removing them is by etching but this is time-consuming. Another, faster way of eliminating tape reflections involves shooting a special type of negative.

A Mylar-base material coated with a diazo-type material is sandwiched with the original in a vacuum frame, under pressure, and exposed to a carbon arc light for the required time.

Then the exposed Mylar sheet is run through the development section of the diazo machine to produce a black diazo image (direct positive). If no diazo machine is available, a material such as Du Pont's Cronaflex can be used to produce a black silver image by following standard production processes.

Why not run the original directly through the diazo machine to make a reproduction instead of contacting the original and diazo material together in the vacuum frame? First, the heat and pressure of the diazo machine's rollers may cause the original tape layout to stretch. Second, the Mylar base, itself, may stretch. Finally, using the vacuum frame assures perfect registration.

When the diazo intermediate is developed, it is inserted in the reproduction camera's copy easel and reproduced as standard copy. Thus, all tape reflection problems are eliminated.

Transmitted (back) *lighting* is used for originals (taped and other) that can fit into the trans-

continued on page 75

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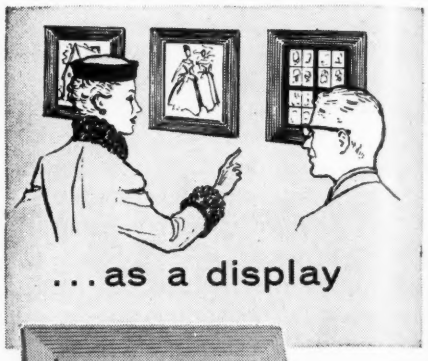

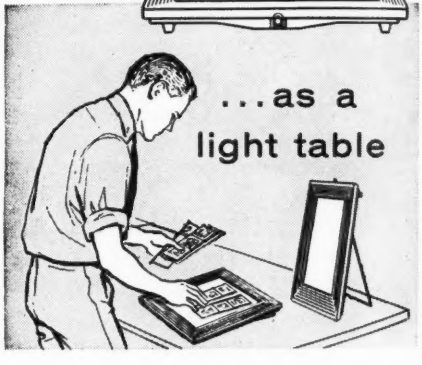

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TRADE SHOW

continued from page 62

thus avoid hiring an electrician to install special lines. Incidentally, electricians usually have access to ladders — so important for shooting from an unusual angle.

Another picture-taking possibility at a trade show is to make a sequence of shots when the crew is setting up or dismantling a display or piece of equipment. Photos will be useful for personnel who assemble equipment at future shows. Similiarly, photos of display elements next to their containers can be useful when repacking.

An overhead shot from a balcony or ladder is useful in recording the position of the booth relative to other displays, and also in showing which parts of the exhibit attracted the largest audience. When photographing from above take several shots in different directions to properly orient the display.

Finally, here are a few rules to remember when setting up the picture: Strive for clear definition of the important item of equipment and pick up company identification if possible. Avoid background clutter or reflections from nearby lights. Frame carefully to avoid excessive cropping at a later time. This will also prevent you from inadvertently including a shot of the competition who might be in the next booth.

Many times the show's manager will be asked for pictures by magazine writers and newspaper reporters. He'll appreciate it if you send him prints of your work for his files. You can do yourself and your company a favor by submitting these prints promptly. Most picture requests come in while the show is in progress or in the weeks immediately following. Working with a manager at a trade show is a two-way street — there are few of these gentlemen unwilling to help photographers if they are given advance notice when you ask for favors. □

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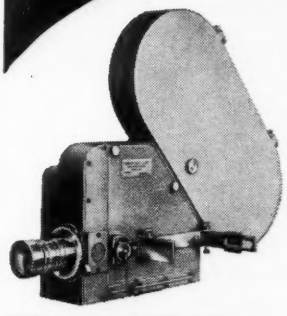

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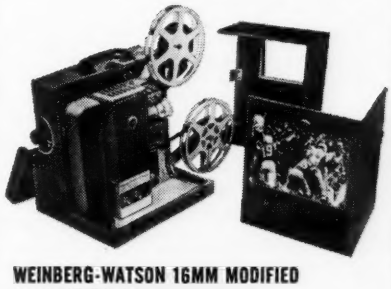

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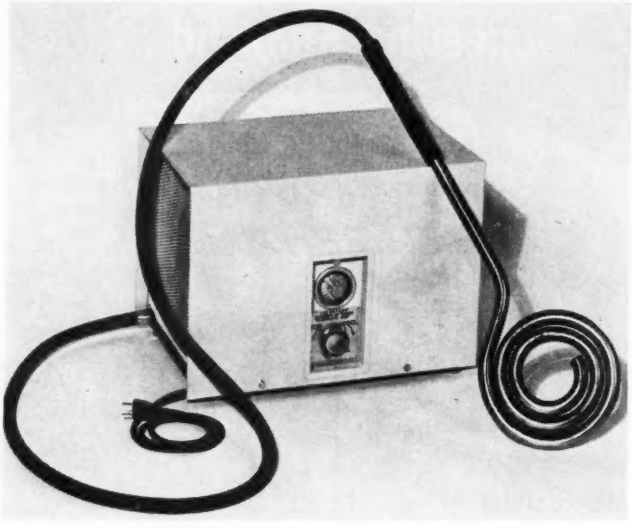

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continued from page 46

stantial amounts of their time on work which, although not performed by subordinates, consist of ordinary production work. This includes people who work in dual capacities — for example, a foreman-production worker or clerk-administrator.

Overtime for eligible workers is computed at time-and-one-half the regular hourly wage rate for all hours above 40 weekly. For computations, a work week does not have to conform to the calendar week so long as it falls within seven days. When salaries are computed on a weekly or monthly basis, the hourly rate is established by dividing the salary by the number of hours which the salary is intended to cover.

Some employees get fixed salaries for irregular hours. For example, an employee may get $66 per week with the understanding that his salary is to cover all hours worked. Since his hours of work fluctuate from week to week, his regular hourly rate of pay also varies as does his overtime rate. This is illustrated by three weeks when he works 40, 44 and 50 hours. His hourly rates would be $1.65, $1.50 and $1.32, respectively, and his overtime rates for the second and third weeks would be $2.25 and $1.98. The same basic principles apply to employees paid flat sums for a day's work without regard to the number of hours.

Avoid Record Keeping

Record keeping is generally best left to the accounting department. However, the photo section may wish to keep simple records of its own for quick reference. These should show the exact daily or weekly schedule of hours each employee is expected to work. Records of completed work schedules should be kept for three years.

In photographic operations as in most others, labor costs often are the largest single item in the cost of doing business. □

NEW PRODUCTS

continued from page 14

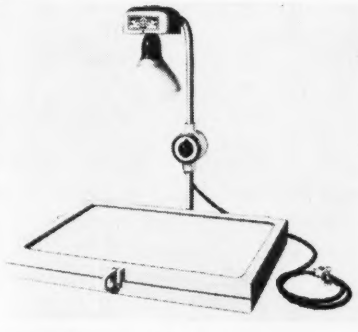
Speed Camera. With a frame rate up to 1.6 million fps, the camera will be useful in the study of arc discharges, fragmentation, shock wave propagation and other areas. The complete system consists of a camera control unit, light control unit and flash lamp. Framing rate and exposure time are continuously variable and independent of each other.

Cooling-Heating Unit **105**

Frigidheat Industries has developed a compact unit measuring 11½" wide 17" long and 12" high designed to cool or heat developing solutions. The portable thermal unit was designed primarily for those who want better quality films through improved solution temperature control. Correct solution temperature is obtained by adjusting the built-in percentage timer. It starts and stops the thermal unit once every 10 minutes. One of the big features of the unit is its portability. Total weight of the device is 54½ lbs. No plumbing is required and the thermal spoon or section that comes in contact with the photographic solutions is constructed of type 316 stainless steel.

Plate Maker **106**

An extremely simple, rugged plate maker called the Sun Dial has been introduced by *Miller Trojan*. The complete unit includes a rugged cast-aluminum frame, foam rubber blanket, support arm to hold hinged lid in raised position



for loading, and a special cam action lock for application of necessary pressure to hold masked flat and plate in contact during exposure. An automatic timer is provided to control an overhead photoflood light source which is mounted in a housing on a support tube to cover an area 13¼" x 18¼". The

Audio Visual Bulletin
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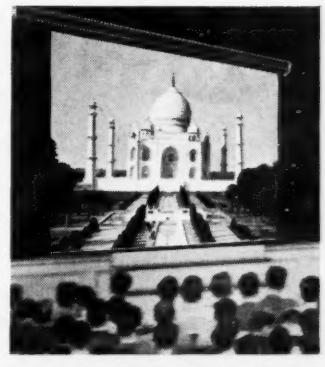

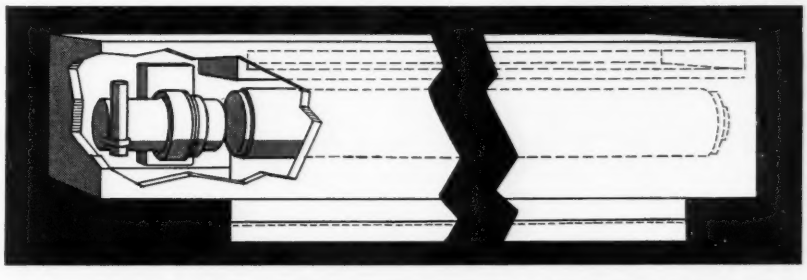

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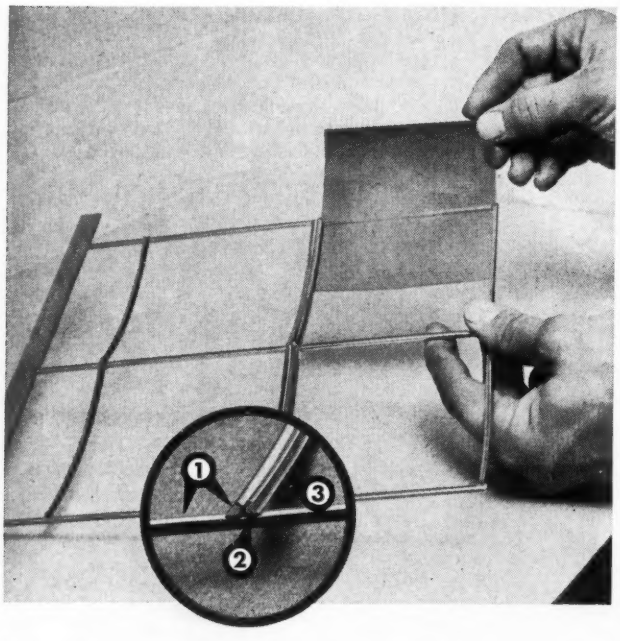

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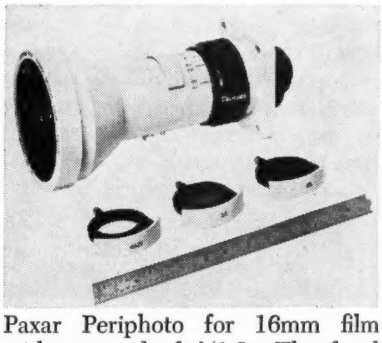
Sun Dial plate maker is designed for use with the new 3M and similar type plates. Price: $94.50.

Industrial Microscope 107

Edmund Scientific Co. is offering a low cost, erect image low-power microscope with a direct reading scale. The instrument should be excellent for such applications as inspection of textiles, paint finishes, machined surfaces and castings and examination of various powdered substances. The reticle has a scale .4″ long with .005″ gradations for 10 power use. The microscope is 6″ long with a base 4½″ x 4½″ and has color corrected optics. Price: $29.95.

Wide Angle Lens 108

Pacific Optical Corp. has added to their line of special lenses a new



Paxar Periphoto for 16mm film with a speed of *f*/1.9. The focal length of the new lens is 3.53mm with a field of view of 165 degrees. The back focal distance is over 1 inch to accommodate the prism of new high speed rotary prism cameras.

Automatic Timers 109

Available for use with the Robot Automatic Photo Recording System from *Karl Heitz, Inc.* are two new timers. The all-electronic units will operate the camera in the range of ¼ to 60 seconds. Two models of electro-mechanical timers are available: one from 1 to 100 minutes, and another from 6 min. to 24

hours. All units eliminate manual operation and release the camera automatically at regular intervals.

They all operate on 110V AC and come equipped with a three foot cord. Price: Electronic unit – $259.00; electro-mechanical timers – $149.00 and $169.00.

Half Frame Projector **110**

A special projector reader designed to project half frame 16mm films is available from *Traid Corp.* Speeds of the 173-H projector are 8 to 16 fps with a governor controlled motor. A second heavy duty motor is incorporated in the base for cooling purposes. Single frame viewing with forward or backward motion can be controlled by a hand crank. Films taken with cameras such as the 917F may be analyzed on the 173-H.

Paper Drill **111**

Lassco Products Inc. has introduced a new product which will find many applications in the photographic department and print shop. The "Spinnit" Electric Bench Model paper drill may be used to rapidly prepare drawings or prints for loose leaf binding. Up to 250 individual sheets or a 1" thickness may be drilled in one stroke. Fea-

continued on page 77

PRINTED CIRCUITS

continued from page 70

parency opening of the camera as in drawing. This methods cuts out any irregular reflection problems.

The film is placed in the vacuum back of the camera and aligned with the drafted original in the easel frame. The carbon arc light passes through the clear portion of the original to the lens. Camera exposure for transmitted light is usually double that needed for reflected light.

When transmitted light is used for reproducing a tape layout, lettering and symbols, which are inked onto the originals, must be checked for capacity. If ink is not applied correctly, light penetrates through the ink and causes a blocked-up area on the negative. The drafting department should be made aware of this back-lighting problem and be advised to use suitable India inks. □

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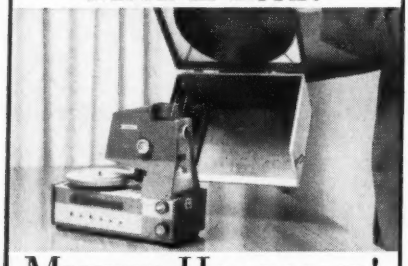

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Related Reading

Commercial Art Techniques

by S. Ralph Mauriello, Tudor Publishing Co., New York, 128 pp.

This instruction handbook offers simple self-instruction in basic art techniques. Essential materials are noted and innumerable hints, shortcuts and suggestions are offered. While not a text for an advanced craftsman, it can be quite useful for any reproduction or offset department member interested in learning how artwork is prepared before it arrives to be photographed.

Infrared and Ultraviolet Photography

Eastman Kodak Co., Rochester, N. Y., 50 pp., $.50.

A revised publication carrying the latest information on Kodak films and how to use them for best results in this specialized field. Kodak's infrared sheet film, 135 film and high-speed film and their applications are discussed in detail. Proper exposure recommendations, to compensate for recent film advances, are given. Illustrations, charts and graphs are also included.

Telephoto and Wide-angle Photography

Robert Simmons, Chilton Co., 155 pp., $1.95

This paperback, part of the Modern Camera Guide series, describes and pictures all kinds of equipment necessary for wide-angle and tele-photography. Standard as well as offbeat cameras and lenses are discussed, and the author gives distributors and prices of these items.

He also whets the reader's appetite for antique lenses by describing a few that might conceivably be found in a second hand store. After having the good fortune to procure a bargain lens the reader is told how to build a camera for it.

A lot of solid reference material is included in the book including diagrams, formulas, and appendices of optical data and interchangeable lenses for 35 and 2¼ cameras. If you're a photographer who ferrets out new equipment this book should make good reading.

Audio-Visual Equipment Directory

National Audio-Visual Association, Fairfax, Va., 250 pages, $4.75.

Three hundred new pieces of equipment have been added to this listing of all types of projectors, screens, stands, recorders and playbacks which are available today from audio-visual dealers. In addition, two new illustrated sections titled "Language Laboratory Systems" and "Transparency-Making Equipment" have been incorporated into the sixth edition of this directory. NAVA's 8½x11 plastic-bound book volume is good to have on your bookshelf.

Professional Printing with Kodak Photographic Papers

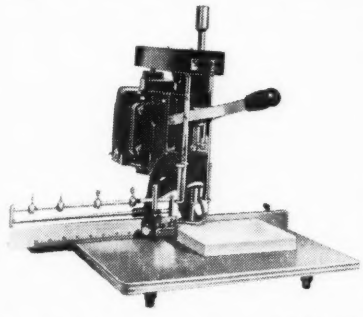
Eastman Kodak Co., Rochester, N. Y., 68 pp., $.50.

A new section on Kodak Panalure Paper, added material on Kodak Polycontrast and industrial papers, updated information on all products and techniques and new illustrations have been included in this second edition. It ranges in content from proper care of darkroom equipment to the mounting and preparation of the finished print. □

NEW PRODUCTS

continued from page 75

tures include twelve hollow-drill sizes; attachments for V-cutting, slitting and slotting; automatic drip disposal; hand-locked adjustments.



Its ⅓ hp motor uses 110V 60 cycle. An electric floor model is also available. Price: bench model, $142.50; floor model, $216.00.

Padding Compound 112

Polychrome Corp. has introduced a cold type padding compound called Polystik No. 216. Polystik is a waterproof compound when dry but is easily washed off when wet with water. The material has a very long life and rapidly sets when applied to paper. The red compound has very strong adhesive power and pads may be bent in half without sheets falling out. Packed in a square glass jar, the wide 3″ mouth will accept large padding brushes.

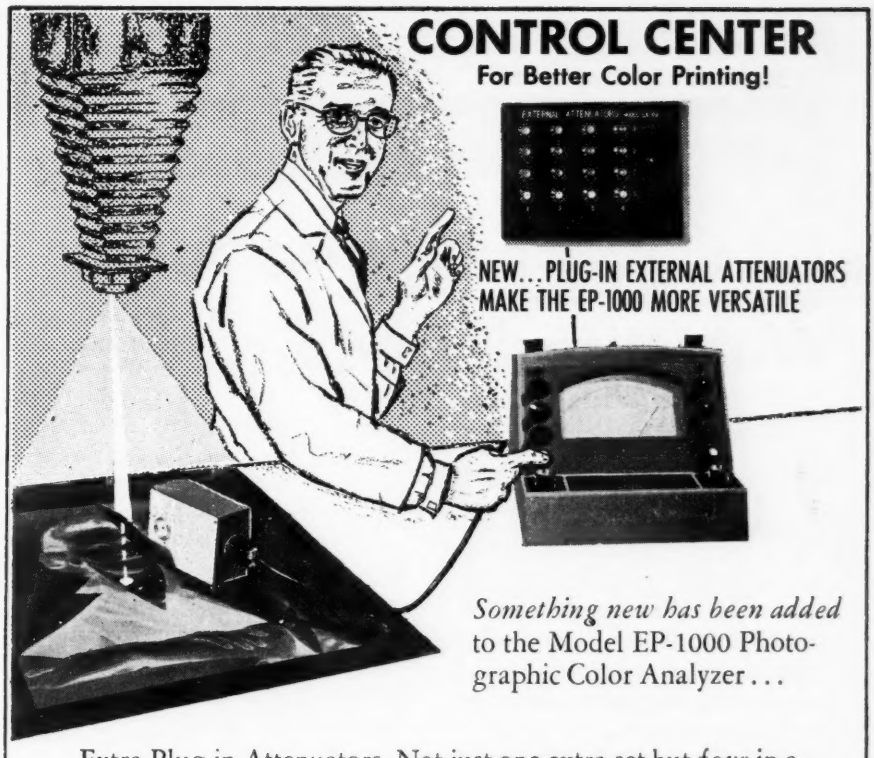
Advanced Electronic Flash Units 113

American Speedlight Corp. has introduced several new electronic flash units. The Model A616 is an 800 watt second studio unit with the power supply mounted at the base of the stand. Four lights may be operated from the one power supply. Another studio unit is the A620 which is rated at 2,400 watt seconds and makes possible a high power main light for larger sets. The A630, an even more powerful 3,200 watt second outfit, uses four light units, each operating at 800 watt seconds. If desired, the full output may be channeled through one lamp.

Darkroom Safelights 114

NuArc Co. Inc., has announced a complete line of darkroom safelights. These are available in nine

continued on page 85



Something new has been added to the Model EP-1000 Photographic Color Analyzer . . .

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Having tied your exposure variables to a reproducible electronic reading you have eliminated the guess work in color analysis, made the first print electronically.

For the name of a dealer in your area who stocks and will demonstrate the EP-1000, and information on the external attenuator accessory EA-40, please address inquiries to Macbeth Instrument Corporation at the address shown below. We will do the rest.

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MICRORECORDING AT WORK

Film Company Wins Space With Microfilmed Accounts

by ROBERT J. DUNPHEY
Office Manager
Wilding Inc.

Valuable space is being reclaimed and restored for productive use in the general accounting offices of Wilding Inc., commercial film producer, thanks to the miracle of microfilm. Big steel filing cabinets have given up enough ground for six desks — providing space badly needed by our order and billing departments. And the best is still to come. We will soon be microfilming all records as they accumulate, and we'll be enjoying more elbow room and footroom than we have had in a decade.

In the first place, all the contents of a large filing cabinet drawer can be recorded on one small roll of microfilm contained in a cardboard box 4 x 4 x 1 inches. But what is also important to us, besides regaining valuable space, is improved availability of our records. Microfilming leaves no chance of misfiling or mislaying records — as long as we go by the sequence numbers permanently recorded on each film roll.

Many of the forms have already been transferred to microfilm and we are currently reproducing permanent account records from our largest vault. We will use space in this room for punched-out cards from tabulating machines.

We divide the nine-drawer microfilm roll cabinets into 5 compartments which hold 125 standard 100-foot rolls of 35mm film.

For our equipment we chose a Remington Rand Film-a-Record camera and reader. With this camera, which has three reduction ratios, and is able to film up one side and down the other at reductions of 25, 35 and 42 to 1, we photograph both sides of the sheet.

The reader is used for both 16 and 35mm microfilm. Our choice presently is 35mm. A sliding lens provides interchangeable magnification for small or large diameter enlargement. A paper-holding easel behind a hinged screen gives printmaking facilities for full-sized facsimile reproduction. □

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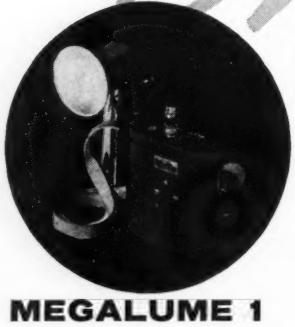

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Super Anscochrome Guide No. 160 w/normal development
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BCPS .....4000 Average
Kodachrome Guide No. 50
Ektachrome Guide No. 90 w/normal development
Super Anscochrome Guide No. 160 w/normal development
Flash Duration .....1/2500 Second
Recycling Time, 5 Seconds to ½ stop
Operates from internal battery or A.C.

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Ektachrome Guide No. 125 w/normal development
Super Anscochrome Guide No. 225 w/normal development
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Hot Rock-and-Roll Records Bootlegged on X-ray Film

A group of enterprising Russian boys who recorded rock-and-roll music on discs of exposed X-ray film and sold them in the black market have been jailed by the Soviet police.

Communist Party officials objected to the jazz records which they claim are an "alien and bourgeois" influence from the West.

The ring members produced the recordings on X-ray film in home studios and peddled them through agents in Siberia, the Ukraine and the Far North.

The X-ray film was fed to the boys by a subsidiary ring. The thin 7-inch discs made from X-ray film were designed for play on one side at 78 rpm and with care they could be made to last for months.

The black market records were more expensive than those sold at government stores and often cost twice as much.

New Free Literature

Keep posted on the latest developments in the photographic field. Each item listed has a key number. For more information circle that same number on the Readers Inquiry Card on opposite page.

INSTRUMENTATION

Framing Camera 201

Beckman & Whitley. Information on the B&W framing cameras.

Record Readers 202

Benson-Lehner Corp. Flyer on angular position digital recording system, digital coordinate comparator, and large area record reader and plotter.

Oscillotron 203

Beattie-Coleman Inc. Flyer contains information on Oscillotron camera recording system.

S.P.I.E. 204

Sample newsletter from Society of Photographic Instrumentation Engineers, national group dedicated to furthering photographic instrumentation.

Instrumentation 205

FMA, Inc. Brochure about electronic-photographic data gathering systems.

High Speed Cameras 206

D. B. Milliken Co. Flyer about small, compact intermittent movement motion picture cameras.

Waddell Cameras 207

Camera Equipment Co., Inc. Information on Waddell high-speed motion picture cameras.

CAMERAS, LENSES, ACCESSORIES

Hasselblad Super Wide C 209

Paillard Inc. Attractively-illustrated brochure describing this Hasselblad model. Includes diagrams of the camera's parts.

Rifle-like Camera Mount 210

Sabre Photographic Supply Co. Data on camera mount which gives support for telephoto shots.

Leica Specifications 211

E. Leitz. Compact descriptions and price list of the Leica M3, M2, IIIg and Ig.

Better Pictures 212

Burke & James, Inc. Booklet on the operation and uses of the commercial view camera with specific information on the Monorail type.

Lenses 213

C. P. Goerz American Optical Co. Technical treatise #GGC3 on the "Red Dot" Artar and other lenses.

Magnifiers 214

Edroy Products Co. Circular dealing with binoculars and all-purpose, folding magnifiers.

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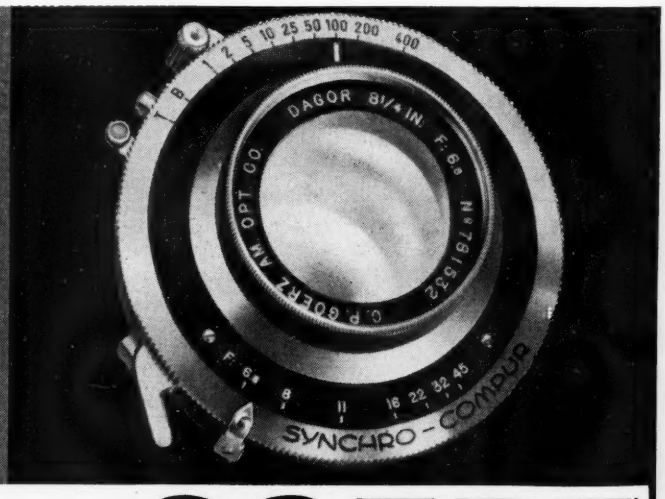

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It which promises to cut squeegee time in half.

CINEMATOGRAPHY

Sound Film Applications **272**

Victor Animatograph Corp. "How Industry Profits from the Use of Sound Films."

Rental Equipment **273**

Birns & Sawyer. Catalog of equipment for documentary and industrial film producers including section on animation and instrumentation equipment.

Film Processor **274**

Andre Debrie. Information about new Aiglonne model "America" automatic daylight film processor which requires no darkroom.

Sound Projector **275**

Bell & Howell. Illustrated flyer on Filmosound Specialist 399-AV, a 16 mm sound projector.

Portable Magnetic Sound Camera **280**

Fairchild Camera and Instrument Corp. 6-page brochure describes the 16mm Cinephonic, a single-system magnetic sound camera which is portable and easily operated.

Tips on Shooting Sports Reels **276**

Labcraft International Corp. Advice on shooting movie film of both daylight and night sports events.

Processor **277**

S. O. S. Cinema Supply Corp. Describes Bridgamatic Model RA 16mm combination reversal and negative-positive processor.

Film Services **278**

Ross-Gaffney, Inc. Pamphlet describes editing, recording, music and sound effects, and other film services.

Rental Catalog **279**

Florman & Babb, Inc. 36 pp. describing motion picture equipment available for rental.

Tripod **281**

National Cine Equipment Co. Descriptive brochure giving information on new Hydrofluid head and matching tripod.

Motion Picture Reduction Printer **282**

Oscar F. Carlson Co. Sheet lists specifications of Carlson Craft Depue Optical Picture Reduction Printer.

LIGHTING

Electronic Flash Units **286**

Electro Powerpacs, Inc. Catalog describes Synctron Electronic Flash units, which are powered by maintenance-free nickel-cadmium batteries.

Light Unit **287**

Lowell Light Photo Engineering. Data on new light unit which eliminates booms and complicated rigging for top and back lights.

Arc Lamps **288**

Strong Electric Corp. Literature on Grafarc and Challenger fully automatic high intensity arc lamps.

Reconditioning Process **289**

Quartz Radiation Corp. Complete details about the Nu-Life reconditioning process which restores burned or worn-out mercury vapor lamps.

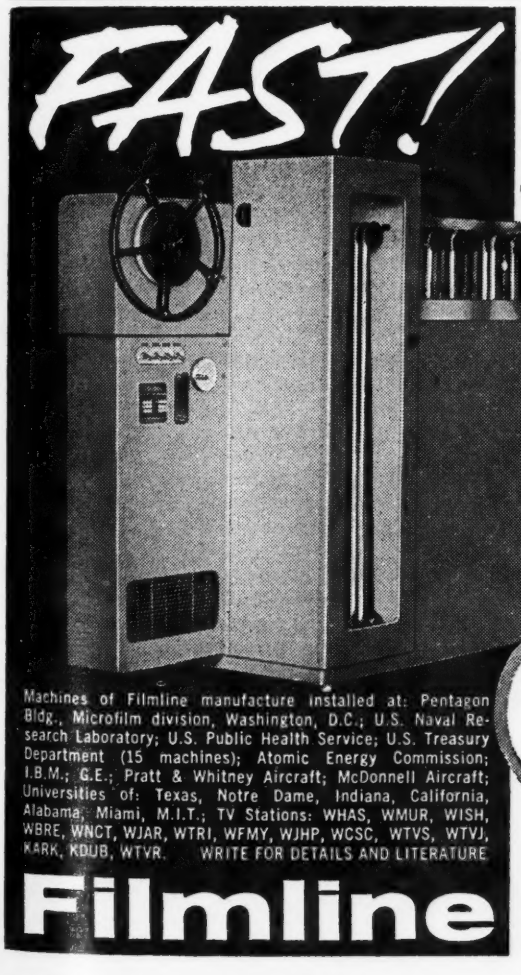
Stage and Studio Lighting **290**

Times Square Stage Lighting Co. Catalog describes complete line of studio and stage lighting equipment and accessories.

Reflector **291**

Photo Lectronic Research. Data on

continued on page 84



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. . . Electronic scanning systems for enhancement of reconnaissance, mapping or aerial survey photographs

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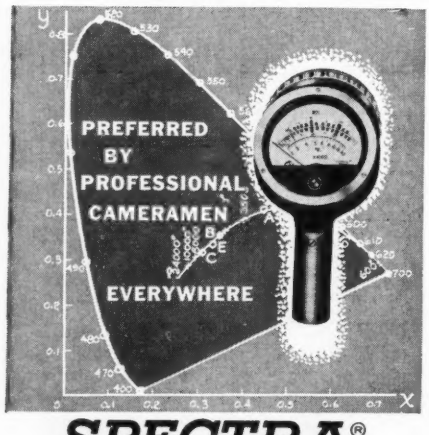

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FREE LITERATURE

continued from page 83

Reflectal, a collapsible, large diameter reflector which features wide angle coverage and extreme diffusion.

MISCELLANEOUS

Books and Guides **292**

Eastman Kodak. Catalog lists the numerous well-written booklets available from Kodak. Subject matter of these leaflets ranges from dye transfers through photographing the stars.

Photo Post Cards, Tip-ons **293**

Grogan Photo Co. Price list and samples of photographic business cards, photostamps and tip-ons. Tip-ons are 1⅝ sq. in. photos gummed on reverse side.

Dictating Machines **294**

DeJur-Amsco Corp. Illustrated flyers describe the versatile Stenorette-T dictating-transcribing machine and the battery-powered portable dictating machine.

Static Can Be Fun **295**

The Simco Co. Details on Simco static bars and six "do it yourself" static experiments to try.

Lens Cleaning Tissue **296**

Bebell & Bebell. Information and a sample of handy 7 x 11-in. lens cleaning tissue.

Exposure Recommendations **297**

Tricolor, Inc. Wallet folder of information for exposure of Ektacolor and Kodacolor negative films.

TO TRACK

continued from page 29

pointing and, of course, the target itself.

A mirror, one half of which was silvered, was located in a small box mounted between the camera and its telescopic lens. The image of the target passed through the clear side and on to the film, while the white dot, entering the mirror box at right angles to the telescopic lens, was reflected from the silvered side to the film. In this manner, both images, one superimposed upon the other, appeared on the same film. The source of the white dot was an oscillograph mounted next to the camera. The position of the dot on the oscillograph was controlled by two potentiometers.

Relatively small in size, the turret was transported to and from the desert test area in California by truck. The "brains" of the operation was a mobile laboratory in which was stored the data and information gathered during the tracking runs. Target aircraft were jet planes supplied by Edwards Air Force Base and they were spotted approaching the site at distances of more than 30 miles away. Today Ryan has similar projects in progress which involve the monitoring of missiles with electronic devices. □

INSTRUMENTATION

continued from page 63

ble. The intermediate step to full automation will be probably a two-stage process of film reduction in which a coarse-fine system is used. The approximate coordinates of the objects to be measured will be read in a high production, medium accuracy type film reader with a punched tape output. This tape will program a high precision, fully automatic reader, which will use the encoded coordinates to position approximately on the point to be measured, then electronically "zero-in" on the point and automatically record the position to a much greater accuracy than could ever be accomplished by a human operator positioning crosshairs.

However, until man develops some radically new method of recording only the object to be measured, or until a computer with the storage and decision-making capability of a human brain is invented, the operators of semiautomatic film readers need not fear technological obsolescence.

(Editor's Note: This column is condensed from a talk given by the author at the 14th annual instrument-automation conference of the Instrument Society of America.)

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saves time and money *SIX WAYS* while doing a better job:

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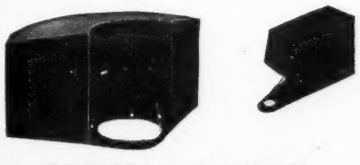

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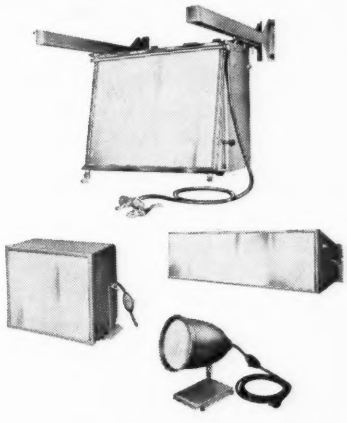
NEW PRODUCTS

continued from page 77

sizes for wall, ceiling or table mounting. All safelights have a metal body with silver, baked enamel hammerloid finish. Inspection Safelights are also available in



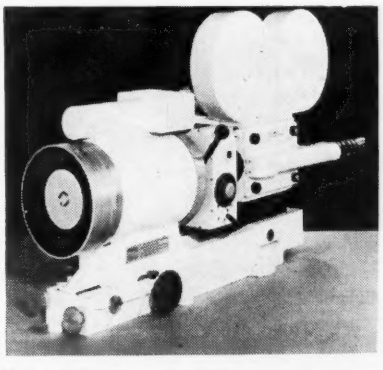
three sizes and can be equipped with overhead rails and water flow system. They incorporate a neoprene coated metal trough and frame, and are available with green, ruby or white lights.

Shutter Tester 115

Aerotronic Associates Inc. has announced a new improved model 104 Shutter Tester. The instrument is designed to combine fast calibration with ease of operation. All controls are located on a sloping front panel and the scale selection switch is direct reading. The model 104 tests camera speeds from 1/1000th to 1 second.

Data Recording Camera 116

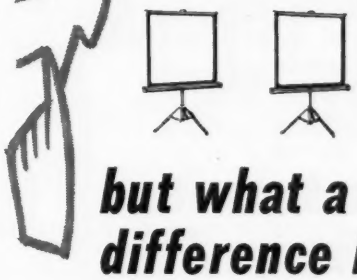
Federal Manufacturing and Engineering Corp. has available the Model IBDM-20 Cameraflex 35mm



Boresight Camera. The camera was designed for use as a radar antenna-mounted boresight camera to obtain pictures and data for calibration, tracking error correction,

continued on page 87

from afar...
they look alike



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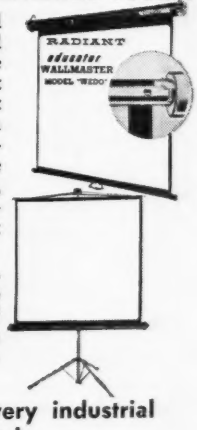

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RAINDROPS

continued from page 23

(2) erosion due to the shearing action of the liquid as it flows at a high speed across the surface, and (3) breaks at the back or throughout the body of the specimen because of the reflection of stress waves from the free surfaces of the solid.

The first type of failure is demonstrated by using a transparent substance called Perspex which is pliable at low rates of disintegration but brittle if deformed rapidly. A raindrop traveling at 2,000 mph will cause a ring crack on the Perspex, with short fractures outside the crack. The surface inside the crack is undamaged.

From photographs the scientists have been able to see the relationship between this pattern of fracture and the stresses exerted by the jet of water during impact. Under the head of the jet the surface will be in compression, but just outside the head of the jet it will be stretched in tension. In addition, these photos show subsurface cracks in the Perspex opening wide during impact and then closing up again, but not completely.

The second type of erosion is demonstrated in the lab with transparent natural rubber. The ring pattern seen in the photographs is not due to an actual break in the material, but is a channel dug in the surface by the rapidly flowing water as it moves outward under pressure from the center of impact. With soft metals such as aluminum there is a pronounced lip on the crater due to the upflow of water during this type of erosion. In hard metals such as stainless steel the

continued on page 90

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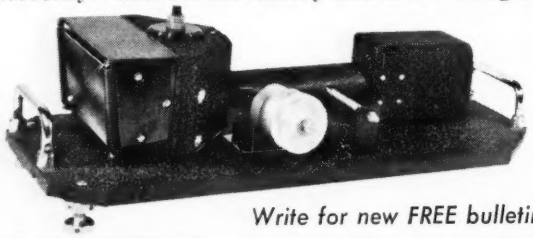

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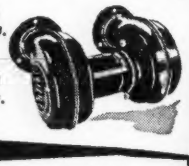

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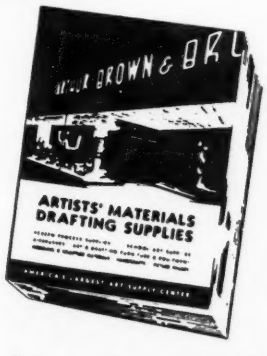

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NEW PRODUCTS

continued from page 85

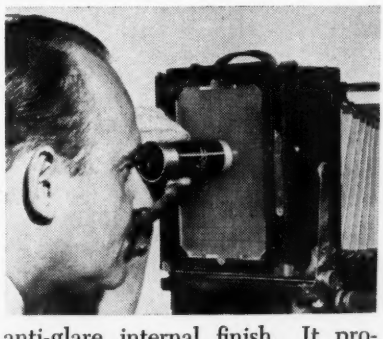
and engineering sequential and documentary use. The IBDM-20 uses 35mm film and has a capacity of 1000′. Magazines for 200′, 400′ and 2000′ are also available. Frame rate is 20 fps with speeds up to 48 fps available with a change of gears. The manually adjustable shutter can be changed from 0 to 120 degrees in six steps. Additional features of the camera are illuminated fiducial markers, automatic buckle switch and three track data recording system for binary recording and timing correlation.

Hand Pump 117

The Nalge Co. has developed a hand pump made of Nalgene high density polyethylene which is said to provide a safe and easy method of pumping liquids from carboys, drums and tanks. A small "drip well" at the top of the pump barrel prevents liquid adhering to the shaft from running down the side and coming in contact with the operator's hands. The spout itself may be turned up after use to prevent drip or may be removed completely for shipping or storage. Small lugs on the bottom of the cylinder prevent the pump from resting on the bottom of the container and permit complete removal of the solution. Capacity of the unit is six strokes per gallon. Price: $15.00.

Focusing Aid 118

A precision magnifying instrument for critical focusing, the Magnifinder, has been designed by *Ednalite Optical Co.* Magnifinder incorporates a coated multi-lens system with a special no-glare eyepiece and a machined, anodized body tube with permanent matte



anti-glare internal finish. It produces a 3.5x magnified image that is critically sharp, optically flat, and color free. In use, the device is

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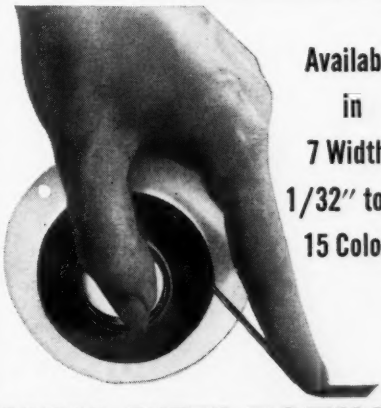

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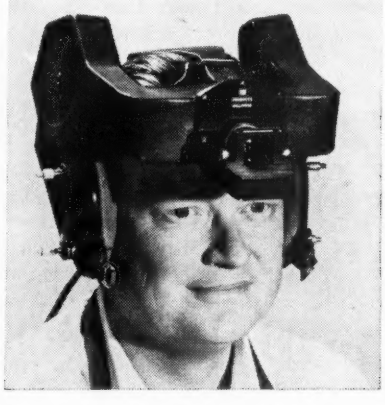
placed on the ground glass of a large view camera or on the focusing screen of a twin lens reflex to give an enlarged and easier-to-focus image. Price: $9.75.

Improved Film 119

Continuing research by *Eastman Kodak* has produced an improved Tri-X film which is said to have reduced grain size and increased image sharpness. The film should be particularly valuable for photography by existing light levels as well as for work where high shutter speeds are required. The new emulsion will make possible larger, sharper enlargements. Exposure index remains the same and processing times have been reduced.

Training Camera 120

An interesting development in checking operator training and performance has come from *Par Products Corp.* A camera designated the Mark IV VRC is designed to



simultaneously photograph the operator's eye movements and the objective within the optical field of view. The purpose of the system is to test the correlation between eye movement and the test objective. The entire camera assembly weighs 4.5 pounds and contains 100 or 200 feet of film on a daylight loading spool. In practice the device is worn on the operator's head like a hat and is said to permit complete freedom of movement with a minimum of strain.

Photo Tester 121

A new photo equipment tester known as the Mills PET is available from the *Mills Photographic Engineering Laboratory.* The portable unit is designed to eliminate the guesswork of photographic equipment performance, and will check shutter speeds, exposure meters, flash circuits, flash cords and electrical darkroom equipment. The unit utilizes a transistorized battery operated circuit and features a special direct reading meter for checking shutter speeds from ½ sec. to 1/1000. Price: $149.95.

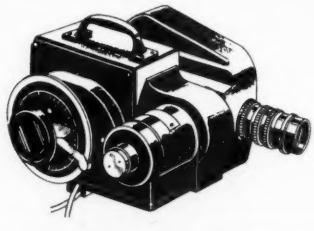
Protective Paint 137

Wolff & Dolan, manufacturers of Probus Preservative Paint, have modernized their line by featuring bright, decorator-approved colors. The new color Probus in green, gray and clear is absolutely waterproof and is ideal for coating tanks, vats, sinks and trays. Probus can also be used on floors and walls to form a tough elastic coating which resists acids, alkali, rust and hypo solutions. Probus clear may be used as an added protective coating over the new colors. All types are available in quarts and gallons. Price: quarts, $4.95; gallons, $14.95.

Supplementary lens 138

A new lens attachment that permits table top photography with the Beattie K5 Oscillotron Camera is now available from *Beattie-Coleman Inc.* Called the "Lensette" the

KODAK 16mm HI SPEED CAMERA



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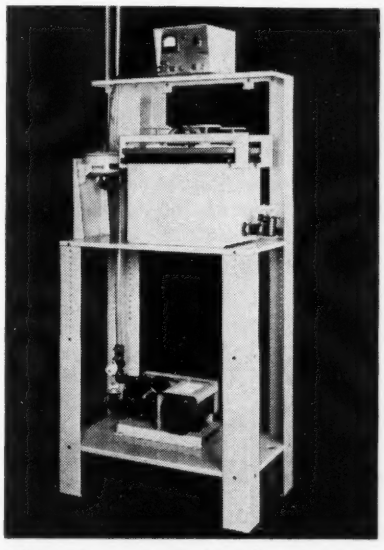
new supplemental lens makes it possible to photograph instruments, bench set-ups, lab tests and inspections. It may be quickly installed or removed to permit the camera to double as oscilloscope unit and as a laboratory camera.

Silver Recovery Unit **122**

The *Pako* Model 88 Silver Saver is now offered in an improved model featuring a number of major changes. Among these are changes in the rectifier, the electrolytic tank and in the leg adjustment. The



Silver Saver is designed to recover silver from hypo solutions by means of an electrolytic process. The saleable silver is 95 to 98 percent pure. In addition to the economic advantage of silver recovery, hypo life is extended by continual reactivation and filtration.

Mercury Lamps **123**

Replacement Mercury vapor lamps for nearly 100 different models of blueprint and white print machines are currently available from *PEK Labs.* These rebuilt lamps are said to combine the advantages of a 120-day operating guarantee with prices ranging from 40 to 20% less than the cost of new lamps. Various improvements over original designs such as increased structural strength and elimination of internal metallic deposits have been incorporated.

Photographic Sinks **124**

Four new models of Apache Fiberglass Sinks have been added to the line of the *Apache Photo Co.* The molded, green all-fiberglass sinks include a 28″ x 58″ model with 36″ shelf for processing tanks.

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NEW PRODUCTS

continued from page 89

The shelf is one inch below the sill to prevent spillage. Other new models are 48″, 60″ and 72″ long by 6″ deep with a 7″ backsplash. All sinks feature rounded corners and are one piece molded. Price: from $89.50.

New Rollei **125**

An economy model Rolleiflex has been recently announced by *Burleigh Brooks Inc.* Called the E-2, it is essentially the same as the preceding model E and is available with an *f*/3.5 Schneider Xenotar lens. Xenotar and Planar *f*/2.8 models are also available. The E-2 comes without a built-in meter although provision is made for its

continued on page 92

RAINDROPS

continued from page 86

depression is shallower but with heavy shear damage at the rim as in the soft metal.

Only hard, nonductile materials are affected by the third type of erosion where breaks occur at the back and throughout the body of the specimen as well as at the front. For these tests both Perspex and blocks of ceramic are used. A compression wave moving in a solid is reflected back from any free surface as a wave of tension. Photographs illustrate that the front surface of the Perspex has been struck by the jet and the normal ring crack produced. Part of the back surface has been blown off, leaving a large crater.

Messieurs Bowden, Brunton and Field are satisfied with the results of these tests which could not have been performed without modern instrumentation photography techniques. New scientific vistas have been opened up to the laboratory man and aircraft designers are incorporating these findings in their specifications. □

(This article appears through the courtesy of the editors of the British edition of *Shell Aviation News*.)

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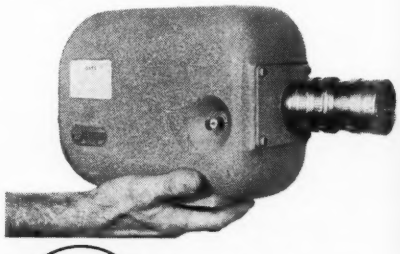

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CIRCLE 7-8300

March 1, 1960

Mr. Allen Bryson
c/o Mohawk Business Machines Corporation
38 East 57 Street
New York 22, New York

Dear Mr. Bryson:

I have just returned from a two-week South American tour with Mr. and Mrs. Bob Considine, for the purpose of recording a series of radio programs for NBC. We recorded the entire series on a portable Mohawk 500, and I just wanted to let you know what wonderful results we had using this machine.

On previous trips I used a larger-size recorder, with which I got good results; but which, because of its weight, gave a great deal of trouble in crowds and in places where I had to follow the action very quickly. With the three-pound Mohawk Midgetape, this problem was completely solved. I had to record in all sorts of locations where it would have been impossible to bring a large recorder without causing a disturbance. The fact that I did not have to stop to rewind the machine at any time was also of tremendous importance to me.

The little machine also attracted a great deal of attention in the course of our tour, and won us many friends. The immediate play-back delighted people, and made it easy for us to find willing subjects for recording.

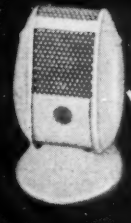
The quality of the Mohawk 500 remained excellent throughout. The NBC engineers assured us on our return that it was the best quality they had ever heard on any portable machine.

All in all, we are more than satisfied with the Mohawk 500, and are looking forward to using the machine on all of our future location assignments.

Very truly yours,

Peter Lassally
Producer Special Projects

PL:nl



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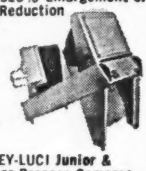

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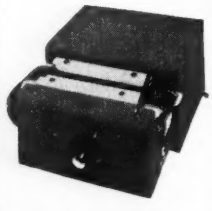

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NEW PRODUCTS

continued from page 90

installation at a later date. Additional features of the new model include a removable hood and the exclusive "Rolleiclear" viewing screen. Automatic parallax compensation and provision for focal plane glass plate in the *f*/2.8 model is also provided. Price: w/f/3.5 Xenotar $199.50; w/f/2.8 Xenotar or Planar; $299.50.

Electronic Flash 126

The Clive Courtenay Co. Ltd has designed an electronic flash unit for applications requiring extreme high light intensities. Maximum output of the power pack is 5000 watt seconds on 110-120V AC. Provision is made for hooking it up to five flash heads with the help of level controls. The Courtenay 5000 Mark I, distributed in Canada and the U. S. by *Electrolabs*, may be ganged by direct wire connection, or triggered in groups by photo-tubes.

Improved Anti-Static Formula 127

An improved Statikil formula is now available from *Statikil, Inc.*, packaged in self spraying cans or bulk for use in neutralizing static electricity. Among some of the uses of the substance are treating of plastic materials and machinery, photographic dryers and developers and paper stock. The effect of spraying Statikil is cumulative and it dries instantly and invisibly. Price: 12 oz. can, $3.00.

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Photo Materials Co. has introduced a new twin surface dryer for glossy or matte prints. The Premier 1800 features an accurate and positive thermostat, a unique tension device for both canvas aprons and variable heat settings from 140 to 195 degrees F. Each drying surface measures 18½" x 24" and has a total capacity of 600 4 x 5 prints per hour. A unique feature of the dryer permits wall or bench mounting with indexed stops so that the operator has control of the rotation at all times. Price: from $59.95.

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What is claimed to be the small-

continued on page 96

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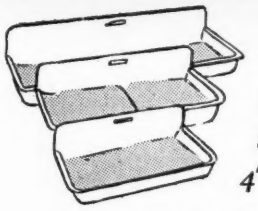

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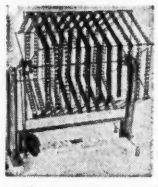

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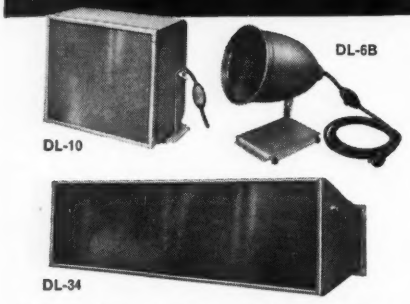

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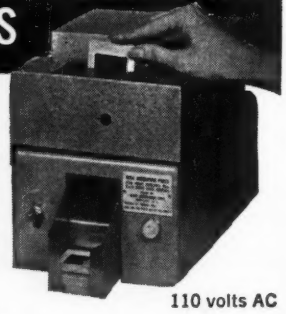

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ARTICLE
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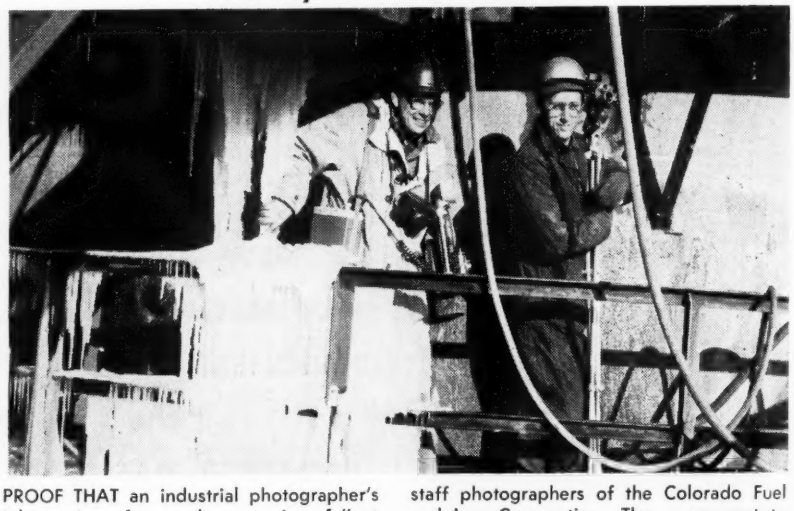
PHOTO

Briefs

JILL ENGLISH, Assistant Editor

Hardly a Bed of Roses



PROOF THAT an industrial photographer's job consists of more than a series of "get a shot of a good-looking secretary with a well-filled sweater" assignments is shown by Frank Sluder (L), and David Roscover, staff photographers of the Colorado Fuel and Iron Corporation. They were sent to get pictures of an ice-encrusted blast furnace at Pueblo, Colorado. The furnace was closed down due to a strike.

Film Congress Held in Oxford; Czech Movie Wins Top Award

Dr. Alexandre Zguridi of the U. S. S. R., president of the International Scientific Film Association, presided at a recent congress of the group in Oxford, England. Attending were 180 delegates who had a chance to view 190 industrial and scientific films.

The Czechoslovak film "Drops and Bubbles" was awarded the British Prize for the best film from overseas screened during the congress.

Dr. Zguridi presented a paper in which he said that popular scientific films are of use to industry because they make known to the public the work of research scientists. Experiments covering long periods can be compressed in time to enable speedy observations to be made—in fact the camera can record events when the scientist himself cannot be present, he added.

Mr. J. Hadland, a leading British authority on high speed and time lapse cinematography, discussed the rapid development of industrial research film making, noting that a technique which had been almost a monopoly of the weapon researchers only four years ago was now widely used. Hadland also felt that there is no totally suitable time lapse camera available to photographers today.

Three-Ton Processing Machine Sent Travelling Around Globe

The portable film processing machine has often been shipped to all parts of the globe, but when a massive processor weighing 6,000 lbs. is transported from trailer to plane and flown over oceans to various distant spots it becomes newsworthy.

Tom Robinson and Don Berryhill of the Naval Research Laboratory have been wet nurses to just such a project. Several years ago the SOS Cinema Supply Corp. installed a Bridgamatic 16/35mm automatic developer at the lab's Washington office. There it processed many thou-

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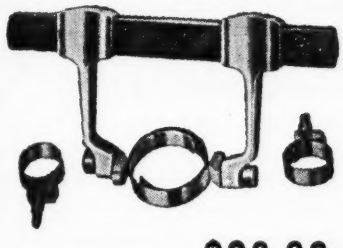

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From Thule Air Force Base in Greenland to Guantanamo in Cuba, with layovers in Bermuda and Nassau, the machine has been picked up by the giant cranes and loaded and unloaded from big flying boxcars as easily as a baby carriage. The Bridgamatic is in operation as soon as plumbing is connected to the available water supply and the current turned on. Often developing chemicals have been improvised from materials on hand.

At its Washington home the processor is kept mounted on skids, ready for the next assignment.

U. S. Gov't Uses A-V Aid As Propaganda Weapon

The Tel-A-Story projector was recently selected by the General Services Administration of the U. S. government to illustrate to the people of Cambodia the American way of life. Using color slides, the polarized screen of the Tel-A-Story brings into focus the standard of living enjoyed in America. The projector changes slides every six seconds.

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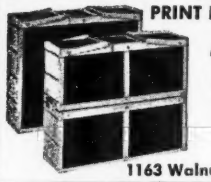

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NEW PRODUCTS

continued from page 92

est single lens reflex 35mm camera been introduced by *DeJur-Amsco Corp.* The new camera, called the DeJur Dekon S.R., comes equipped with an *f*/2.8 four-element, coated Simlar lens. Focusing is by fingertip action through the wide open lens. When the shutter button is released, the lens closes down automatically to a pre-set stop and the shutter releases. All types of synchronization are provided as well as a single-stroke rapid transport lever which advances the film and cocks the shutter. Focusing range is down to 24" without close-up attachments. A 37mm *f*/4 wide angle attachment and an 85mm *f*/4 auxiliary telephoto are available. Price: $89.50.

Focusing Aid 136

Accurate focusing and alignment of most Traid, B & H 70 series and Eyemo cameras is provided with the 601 K boresight available from *Traid Corp.* The boresight is fitted to a camera door and features a 360 degree rotating ocular with an erecting prism. Magnification is from 51x to 40x. Price: $475.

Minute Man Oscillotron 139

A new, simplified oscilloscope recording camera has been introduced by *Beattie-Coleman, Inc.* Known as the "Minute Man Oscillotron," it features a Polaroid Land back and attaches to any five-inch oscilloscope. The camera swings out and lifts off for easy accessibility. Wollensak 75mm for easy accessibility.

COLOR SUPPLEMENT

continued from page 54

Grafic Equipment Co.
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Makes a manual color processing unit which handles film as well as paper. Unit's capacity: (a) paper-16 x 20, 20 sheets at once; (b) film-11 x 14-10 sheets. Unit comes with nitrogen burst equipment and pre-fitted plumbing. Will build this equipment to specification. Fluid solution capacity of tanks: 3½ to 10 gals. Unit is made of stainless steel. Basic price: $1500 to 3000.

Grafic also manufactures storage tanks, temperature control units, processing baskets and gas burst systems.

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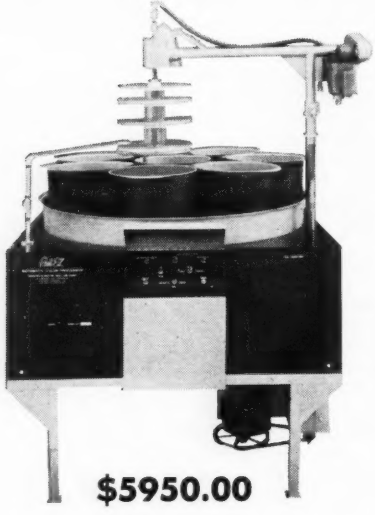

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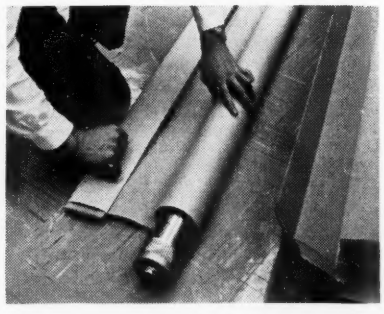
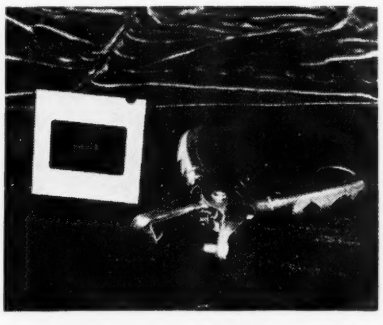


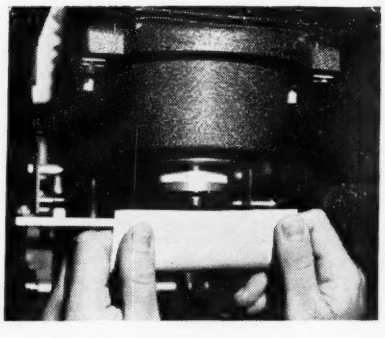
The next time you hang a roll of seamless background paper, turn over the leading end and staple it to a strip of cardboard cut from its shipping carton. This reinforcement keeps the edge from tearing, keeps the free end hanging for easy unrolling. — *Joseph Gonzales, Procter & Gamble Co.*

NOTCH SLIDES



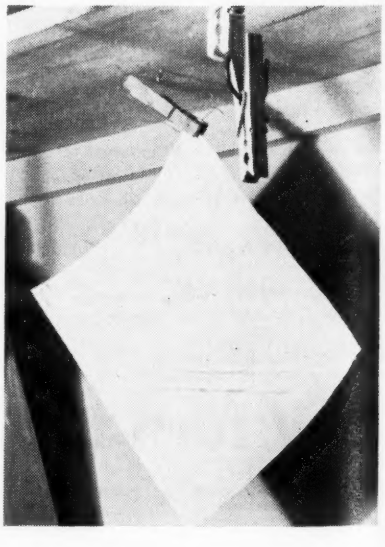
Using a simple, inexpensive dime-store punch, place a notch in the upper right hand corner of your standard cardboard-framed slides. The position of the notch, and hence of the slide, can be felt in the dark when projecting the slides manually. *V. E. Morris, Wauwatosa, Wisc.*

SHEET OF PAPER MAKES ENLARGER REFLECTOR



There are times when a flashlight is not available for viewing the *f*/stops on the enlarger lens. At such times, a sheet of double-weight, 4 x 5″ paper can be used to reflect light onto the lens board and thus make the *f*/stops easier to read. *Leonard Shields, Brooklyn, N. Y.*

QUICK WAY TO MAKE B&W FROM COLOR



Confronted with making black-and-white prints from color negs and not having the time to make the prints on recommended data (Panalure paper and its safelight), I did the following: stopped the enlarger down to get its optimum contrast, used a 3 grade of paper with approximately 30 seconds exposure, and was able to obtain excellent results. In all phases of printing, I worked for highest contrast, using normal printing procedures. —*Joe Perez, Conklin, N. Y.*

INDUSTRIAL PHOTOGRAPHY • SECTION 2 • APRIL 1960

Data Processing and MICROFILMING SYSTEMS

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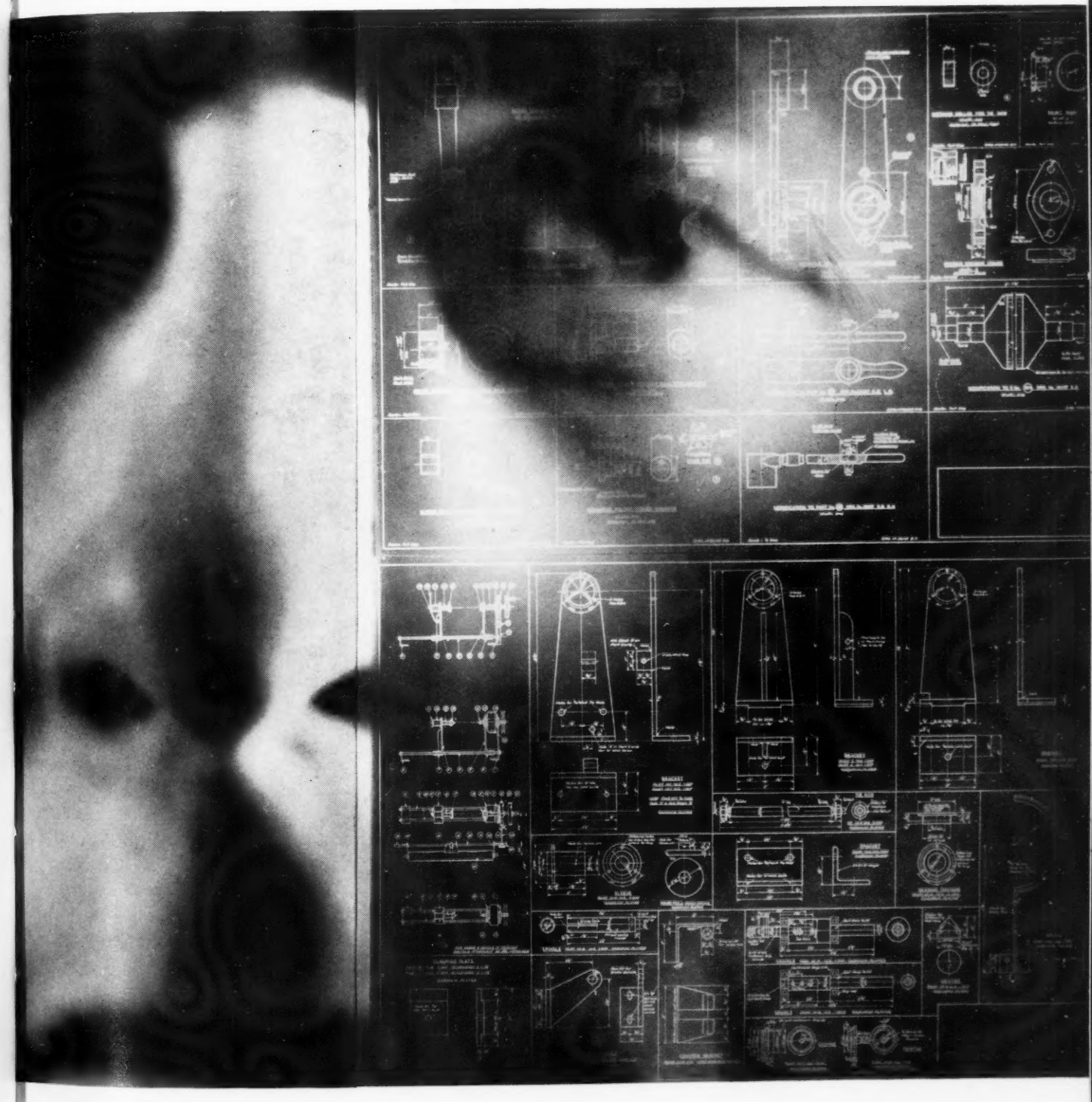

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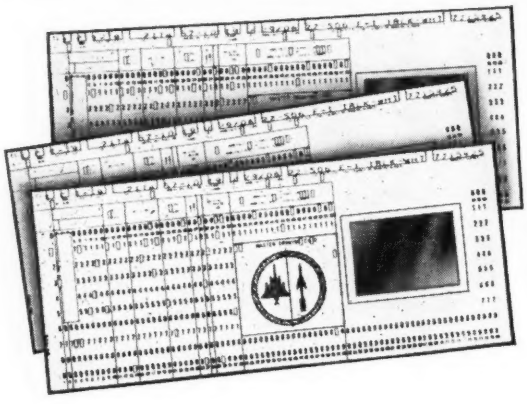

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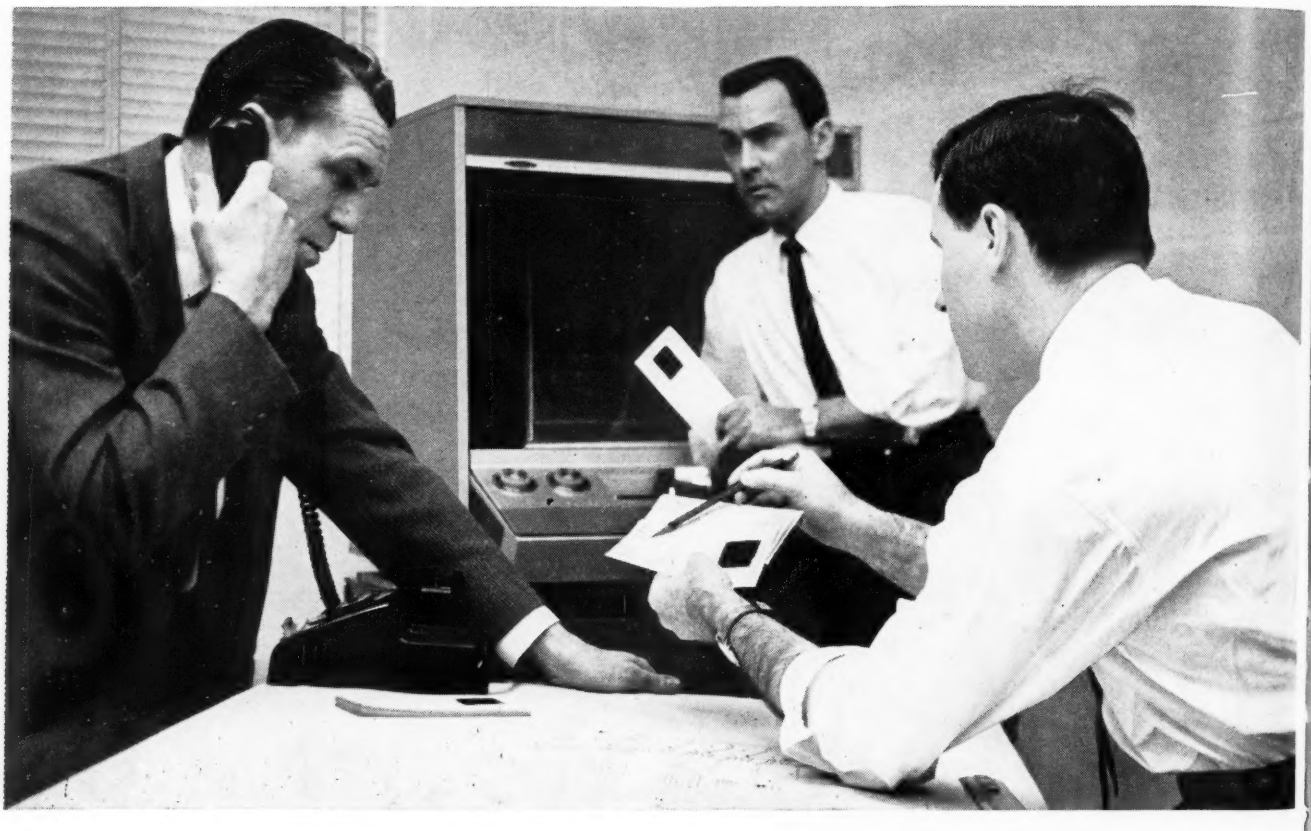

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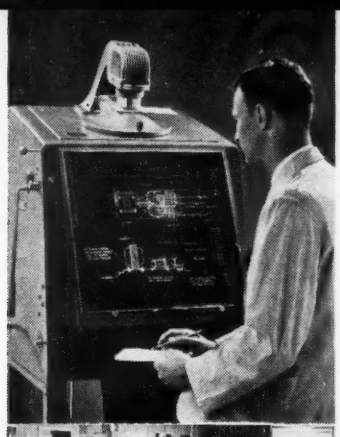

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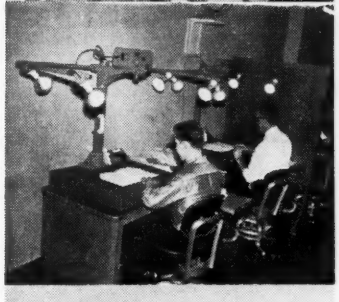

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April 1960

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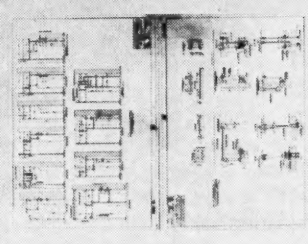

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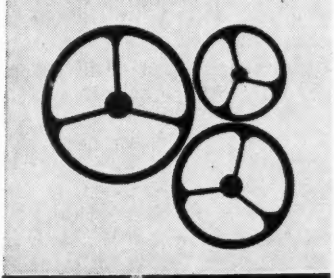

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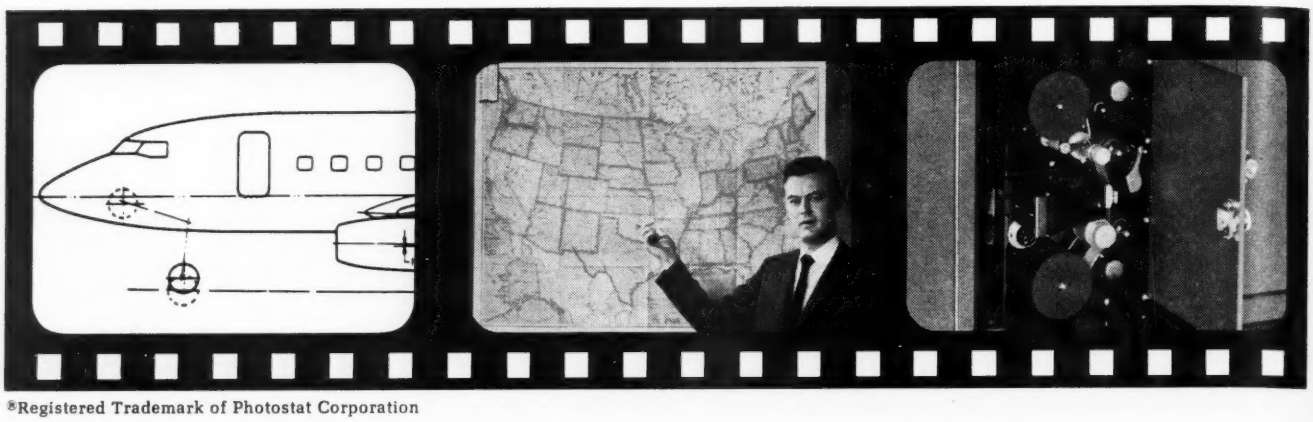
REPRODUCTIONEER

PHOTOSTAT® CORPORATION REPORT ON MICROFILM AND PHOTOCOPY METHODS



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The aircraft and shipbuilding industries face a unique problem with microfilm. Many of their engineering drawings are too large to microfilm in a single frame by any conventional means.

One of these companies, a large West Coast aircraft manufacturer, ran tests to find out how much time was lost in referring to a series of frames for information on a single drawing.

They found that it was five times faster to gather simple information from a simple drawing by working with a *continuous image* than it was with a four-frame sequence. It was also 75% to 100% more accurate. If they had used a normal structure drawing, with its complex detail, the results would have been even more impressive.

This company decided to use a continuous-image microfilm program. They had a backlog of over 500,000 drawings, 5,000,000 related documents, current releases at the rate of 30,000 per year . . . and a Photostat 42″ microfilm camera-enlarger.

Today, they are handling a work load of 90,000 drawing releases, with high-quality results.

GET THE BIG PICTURE BACK AGAIN . . .

Put your microfilm back in the Photostat 42″ microfilm camera-enlarger and you can flow-project a sharp, exact reproduction on sensitized paper—because this amazing camera is also a flow enlarger.

Make your paper reproductions full scale if you like, or in any scale reduction with a consequent saving in paper and chemicals.

Reproductions are crisply detailed. They go back through the same optical system and the same system of synchronization that originally put them on microfilm. All dimensions are rigidly exact.

It's a good idea to use Photostat photographic paper for your reproductions. These include a thin translucent paper for intermediates for making blue line copies. Paper suitable for engineering purposes is available in a wide range of widths up to 42″

Why not check with your Photostat Corporation sales and service office for details on paper—and for *all* your microfilming needs.

WHY WE'RE FINICKY ABOUT FLOW . . .

We're fussy about flow—flow of film, precisely synchronized with flow of copy in the Photostat 42″ microfilm camera-enlarger.

Drawings run through this equipment at the rate of 40 feet per minute. For every camera sold, we individually synchronize the film mechanism with document flow speed. This corrects discrepancies between the two vital flows due to lens and motor tolerances.

We run test after test, adjusting film speed to compensate for any out-of-flow condition at every reduction ratio.

And when this camera leaves our plant for *yours* . . . what then? Well, we still consider it our baby. Its case history, result of an intensive study of the camera's operation, waits in our files. When you want it returned, we have its record all here. We watch and service your camera all the time you have it.

Consequently, you are always sure of needle-sharp reproduction of the work you feed to this continuous-image machine.

We will process your microfilm, too. Just send it to one of our processing stations in New York, Chicago, or Los Angeles.

If your films are classified and you want to process them yourself, investigate the Photostat office-type microfilm processor. We'll be glad to send you literature.

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EDITORIAL

The Systems Decade

The ten years just completed have been revolutionary ones in their impact on the acceptance and applications of microfilming. Microfilm has changed from a dead storage medium into a live communications tool. From dusty archives it has moved into space-age systems. This supplement to INDUSTRIAL PHOTOGRAPHY is a tribute to that rapid evolution.

As a systems tool, microfilm is just out of its infancy. It has just learned its three R's (reduction, retrieval and reproduction) and is starting to apply them. Even at this early stage, the applications are almost too many to count; there is no area of business, industry, government or science which is not daily finding new uses for microfilming systems. The outlook for the future is even more awesome. On the horizon are fully automatic retrieval systems, built-in retrieval and blowback, computer-linked microfilm systems for data processing and other wonders strictly out of "science-fiction."

"Data Processing and Microfilming Systems" will keep its readers up to date on these developments and, hopefully, stimulate ideas and comments. As new ideas, methods and procedures come up in this fast-growing field, we will pass them on to you. And we hope that you, in turn, will write to us and give us your suggestions. In a young industry such as that of data processing and microfilming systems a free exchange of ideas is a must for growth.

Microfilming is part of the broader picture of data processing. In itself it is a key to successful communications systems. The 1950s have been referred to as the electronic era. The 1960s may very well turn out to be the systems decade. "Data Processing and Microfilming Systems" will chronicle it.

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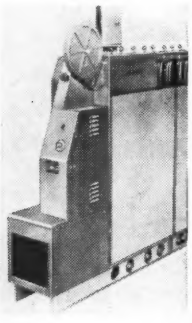
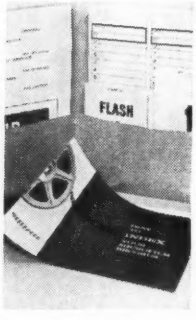
New Equipment Review

For more information without obligation circle same number on Reader's Inquiry Card (pp. 33-34).



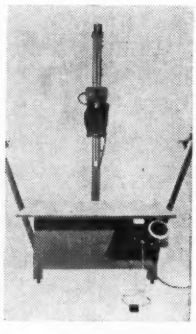
Automatic Processor 801

A completely automatic film processing machine for microfilm has been announced by *Houston Fearless Corp.* Called the microfilm Labmaster, the unit will accommodate 16mm or a combination of 16/35mm film. The Labmaster, which handles film at speeds up to 40 feet per minute, incorporates an alkaline pre-bath, dye back remover and a refrigeration system. Processed film passes through a dry box equppped with infrared heat lamps and an air filter .



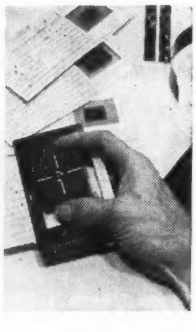
Indexing Kit 802

Convenient reference to microfilmed records has been provided in an easy step-by-step method by *Recordak Corp.* The new indexing kit provides for easy organization of the files to be filmed together with reference targets to properly assemble the material on film. Included in the kit are flash cards, camera operator's certificates and other necessary forms. This equipment can be used with most makes of microfilmers. Price: $7.50.



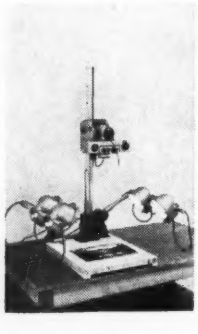
Microfilm Equipment Package 803

Remington Rand has announced a package plan for microfilm users which includes camera, film, Universal processor, UniKards and readers. Known as the Film-a-Record Micro-Station Package Plan, the camera used is a power-driven F36.1PL planetary unit capable of copying material up to 36x47". Processing is done on the Unipro Microfilm Processor that handles 16, 35, and 70mm films in lengths up to 100 ft.



Low-Cost Microfilm Viewer 804

Taylor-Merchant Corp. has turned its talents to the design of a pocket microfilm reader with 10X magnification. A unique feature of the unit is the vertical and horizontal scanning permitted without moving the film itself. The lens housing itself moves along hidden tracks to permit complete vertical scanning. Made of laminated card stock, the entire viewer folds flat and slips into its own plastic wallet. Price: about $2.



Micromat Enlarger/Copy Camera 805

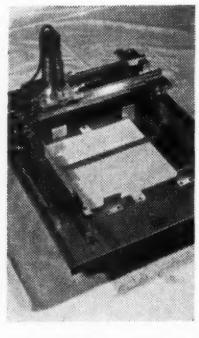
Durst's M35 Micromat can be used for microcopying, slide duplication and strip film production on double-frame 35mm film. Operating for enlargements up to 17X, manual focusing is available for larger projection or copy by swinging the enlarging head and column 180°. The negative carrier holds film flat, has a rotating mask for 24x24mm size and a retaining spring for single negatives.

Reader/Printer 806

A reader/printer that automatically produces positive prints from negative microfilm has been announced by *Documat Corp.* Both roll film and unitized cards may be viewed on the reader. Additional features of the combination machine are a rotating head, finger-tip traverse and centering controls, and instantly interchangeable lenses. Reproduced copies emerge in front of the operator from a small device on the base of the viewer.

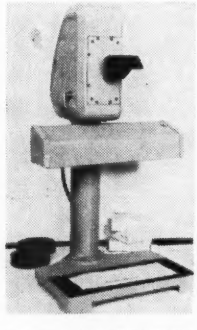
Reducing Printer, Processor 807

A new Paragon-Revolute Continuous Printer which takes pictures of drawings as they move through the machine has been introduced by this division of *Chas. Bruning Co.* It will accept original copy up to 42 inches wide by any length and has speeds variable from 3 to 30 feet per minute. Exposure is controlled by conveyor speed, lighting, shutter opening and aperture. Reduced size copies can be negatives or positives.



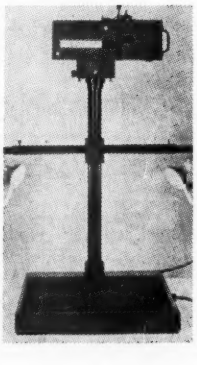
Information Retrieval Systems 808

Termatrex Information Retrieval systems are currently being produced by *Jonker Business Machines, Inc.* The Termatrex systems are based on superimposable or "peek-a-boo" cards. The machines treat all microforms as ordinary documents whether they are a microfilm image in an aperture card, a titled Microcard, or a mounted Microtape. The system is the opposite of the usual data processing system.



Microfilm Recorder 809

A portable 16mm microfilm recorder weighing only 20 pounds is being marketed by *Regiscope Corporation of America.* Called the Regiscope Microfilmer, it requires no focusing and has its own built-in "green ray" lighting system. The Microfilmer permits the used portion of the film to be developed without exposing the unused portion. A light touch on a lever takes the picture and automatically transports the film.



Microfilm Camera 810

A new 35mm camera, the Model PD1100, is being marketed by *Photo Devices, Inc.* The camera has a capacity of 100 feet of standard 35mm film and is mounted on an upright ending in a baseboard measuring 14x17". The removable magazine features a cut-off knife to permit middle-of-the-roll processing. Baseboard is lighted by four reflector floods. The light intensity may also be varied by a separate control.

continued on page 36

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Cincinnati, Ohio
Metropolitan Microfilming Company

Cleveland, Ohio
Micro Photo Incorporated

Columbus, Ohio
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Dallas, Texas
Microfilm Service & Sales Company

Detroit, Michigan
Industrial Microfilm Company

East Aurora, New York
Both and Teall Microfilm Service

Indianapolis, Indiana
The Frederic Luther Company

Knoxville, Tennessee
Microfax, Incorporated

Lansing, Michigan
Toaz Microfilm Service

Los Angeles, California
Microfilm Company of California

Louisville, Kentucky
Louisville Microfilm Incorporated

Milwaukee and Appleton, Wisconsin
M & S Microfilm Service, Inc.

Minneapolis, Minnesota
Northern Business Controls Co.

New York and Connecticut
American Microfilming Service Co.

Palo Alto, California
Bay Microfilm Service

Philadelphia, Pennsylvania
Microsurance Incorporated

Pittsburgh, Pennsylvania
Microfilming Corp. of Pennsylvania

Rochester, New York
Rochester Microfilm Company

St. Louis, Missouri
Central Microfilming Service Corp.

Salt Lake City, Utah
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Microcard Corporation

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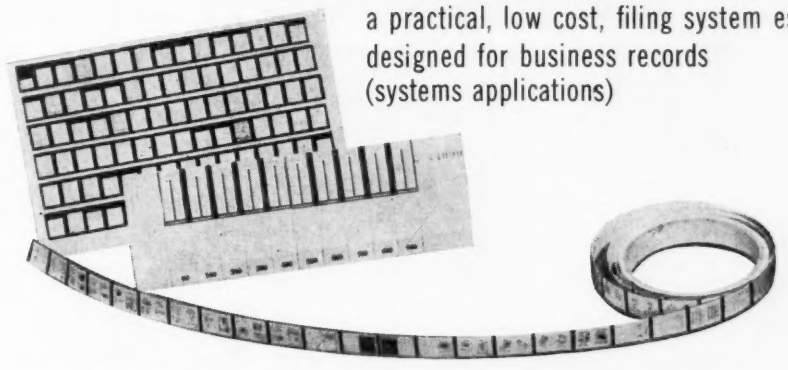
a practical, low cost, filing system especially designed for business records (systems applications)



MICROTAPE* filing systems are a new concept in records keeping, for they offer the full protection and space-saving advantages of microfilm on active records, plus increased efficiency, plus the flexibility of MICROCARDS.* It is ideal for systems applications or for single copy or minimum copy users.

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A typical MICROTAPE card is 3″ x 5″, on which you can attach 40 pages of 8½″ x 11″ material in MICROTAPE form. You merely cut the rolls of MICROTAPE into proper units and apply to ordinary paper index cards. There's no need for glue or paste, MICROTAPE has a pressure-sensitive adhesive laminated to the back side.

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We make 100′ rolls of 16MM or 35MM positive microtext from your material directly, or from your 16MM or 35MM Microfilm negative rolls. The advantage, of course, in using MICROTAPE cards is that additions and corrections are easily made and they eliminate the need for hunting through thousands of items to find specific material.

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For further information, contact one of the authorized MICROTAPE Dealers listed below, or write to:

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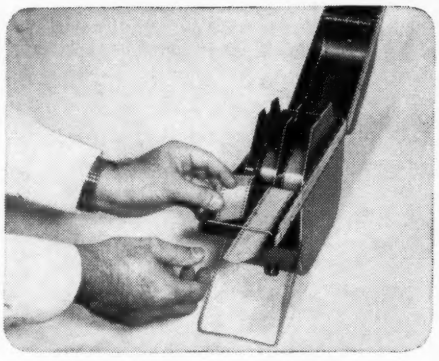

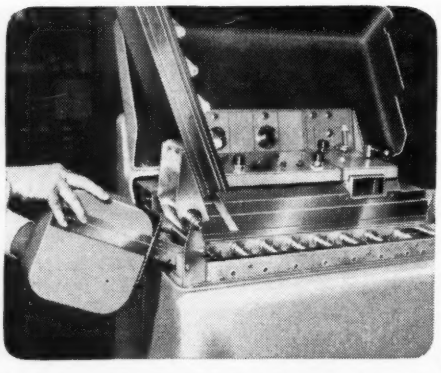

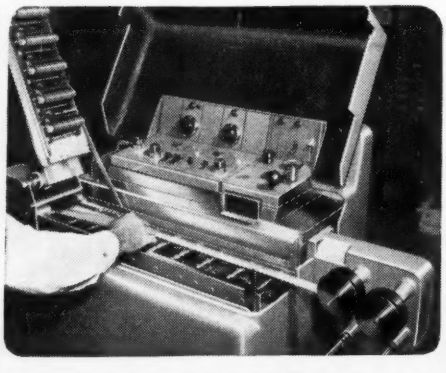

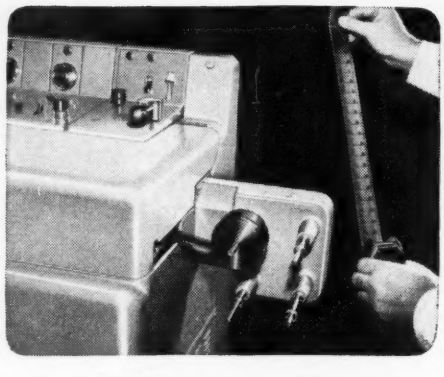

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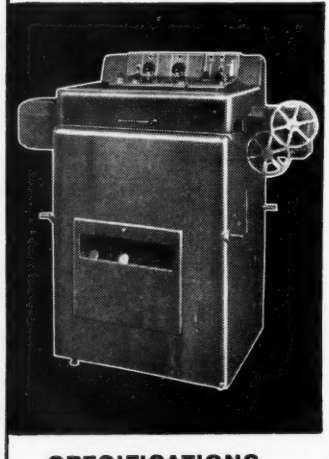
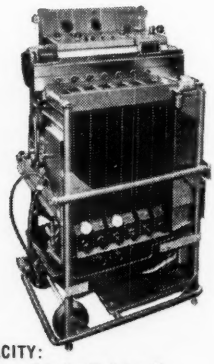
The Mark 3 Automatic Tri-Film Processor develops and dries 16, 35 and 70 mm. film at 1½, 3 or 6 feet a minute. Separate temperature control of the processing solutions from 60 to 110 degrees F. is possible within ±1 degree. Processing is controlled by a mechanical program unit after the film is daylight loaded, and positive squeegee rollers reduce the need of stop baths and interbath rinses. The processor is perfect for newsreels, motion picture rushes, microfilm and all types of negative/positive cinematography where speed plus quality is essential.





SPECIFICATIONS
SIZE: 54″ long, 22″ wide, 51″ high
WEIGHT: 550 lbs.
POWER: 5KVA maximum single-phase: 110 volts, 45 amps., or to customer requirements.

CAPACITY:
16 mm. 1 to 4 rolls } length
35 mm. 1 to 2 rolls } to
70 mm. 1 roll } 400 ft.

PROCESS RATE: 1½, 3 or 6 ft. a minute.

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Industry News

● **Stirring up comment throughout** the microfilming world is the recently concluded Department of Defense meeting on Engineering Data Micro-Reproduction Systems and the ensuing specifications. The result of DOD project Misc-0047 has been the adoption of 35mm microfilm as the only medium which the government will accept for retrievable systems. Another project, Misc-0048, which deals with reproduction of construction drawings and maps, has resulted in the selection of 105mm as the only medium which the government will accept. Government specifications for both 35mm and 105mm are currently being distributed to all manufacturers, contractors and interested parties. The specifications show 16X, 20X, 24X and 30X reduction ratios with no tolerances. The DOD's adoption of microfilm as the only medium in which materials will be accepted is added impetus for the fast-growing industry even though some industry members may question details of the various specs involved. A complete report on the new standards will appear shortly in "Data Processing and Microfilming Systems."

● **National Microfilm Association** has reissued a book that should be of interest to everyone concerned with the micro-recording industry, "Microfilm, a History" by Frederic Luther. This well-written volume traces the field back to its embryonic beginnings in 1839. It is available from N. M. A., P. O. Box 386, Annapolis, Maryland.

● **International Geophysical** Year has come and gone but the data collected will stay forever, recorded on and retrievable from Microcards. Approximately one million pages of meteorological observations are being converted into some 18,000 Microcards per set as the means of disseminating data gathered from 2,500 observation stations. The first data was on its way to recipients even before the end of the IGY.

● *News about people*: Edward T. Freel, former field director of the Paper Work Management Task Force of the Hoover Commission and manager of the Microfilm Division, has been named assistant to the president of Datagraphic Systems, Inc.

. . . **Dr. James L. Lundy,** Sales Administration and Control Manager of Photostat Corporation, served as chairman of a panel of experts recently at a three-day seminar on the application of duplicating and reproduction services conducted by the American Management Association.

CUTTING DOWN the National Budget. Betty Thompson, Miss Microfilm of 1960, displays a strip of 16mm microfilm containing the 1,200-odd pages of the national budget.

. . . **Dale S. Kuebler,** former supervisor of microfilming and Records Storage Operations at Ford Motor Company, has joined Photo Devices, Inc.

● *Company Notes*: Transfer of all executive offices and manufacturing facilities of *The Filmsort Company,* recently acquired by *Minnesota Mining and Manufacturing Company,* to Minneapolis is expected to be completed shortly. . . . A major re-

continued on page 47

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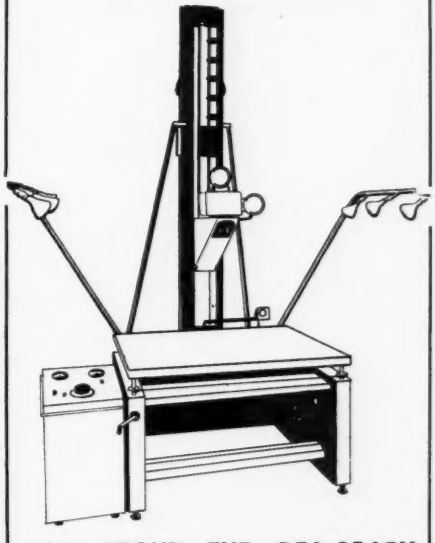

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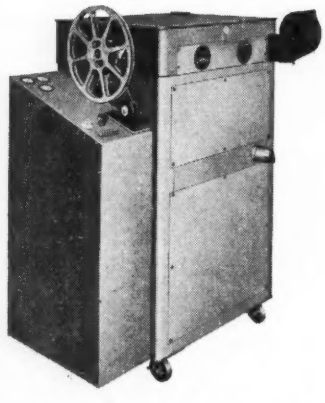

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Circle No. 10 on Post Card

Microfilm Topics

by HUBBARD BALLOU
Columbia University

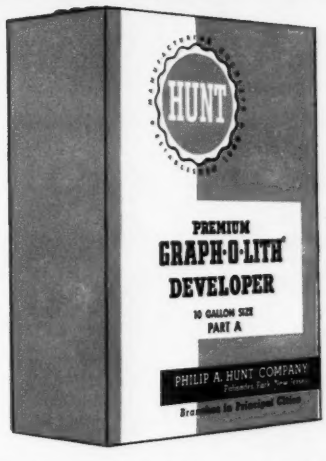
The outstanding news this year has concerned the administrative rather than the technological phases of the craft. Of first importance have been realignments within the industry. In 1957 the Itek Corporation was established in Massachusetts to perform research and development in the fields of graphic data processing, photography, optics and electronics. Shortly after the Washington meeting of the National Microfilm Association (the beginning of the microphotographic fiscal year), it was announced that Itek had purchased the Photostat Corporation. This gave Itek a company that has been active in photoduplication since 1911, and one that has been in the field of microphotography since 1953 when it took over Microtronics. Later in the year it was anounced that Photostat had purchased the Flofilm division of Diebold, thus giving it one of the oldest lines of microfilm equipment.

For years Minnesota Mining has been linked in the mind of the public with its ubiquitous Scotch tape alone. In 1950 the company introduced the Thermofax line of office copiers, and thereby became involved in document copying. Two and a half years ago they entered the microfilm field with a reader-printer, that unfortunately carried the Thermofax name though it does not use the Thermofax principle. This past year they wisely changed the name of this machine to the Filmac 100 reader-printer and released a larger model, the Filmac 200, to handle Filmsort cards and produce a print 18 x 24 inches in size. In November 3M purchased the Filmsort Company, thus committing itself wholeheartedly to the field of microfilming. This should result in benefits to the industry, as it will combine the research facilities of 3M with the microfilming experience of Filmsort.

The Ozalid division of General Aniline and Film has been active in microfilming for many years, first with Ozalid duplicate microfilm and printers, and then through the Microline series of equipment and services. Douglas Aircraft has been one of the most active users of Ozalid equipment and helped to establish the applications of Ozalid's Actifilm system. A result of this joint interest has been the formation in California of Datagraphic Systems, Inc, owned by both companies and dedicated to more efficient record systems through the use of graphic arts. Datagraphic will also distribute Microline products.

The various branches of the government have been among the most active users of microphotography in this country. A problem facing the numerous producers of microfilm for the government, especially the armed forces, has been the many different specifications that were set up by each department involved. In July a meeting was called under the sponsorship of the Department of Defense, at which representatives from more than forty organizations met to consider coordinated microfilming specifications. This group reviewed problems of resolution, film density, reduction ratios, and non-silver films. The recommendations of the July meeting were examined at additional

continued on page 20



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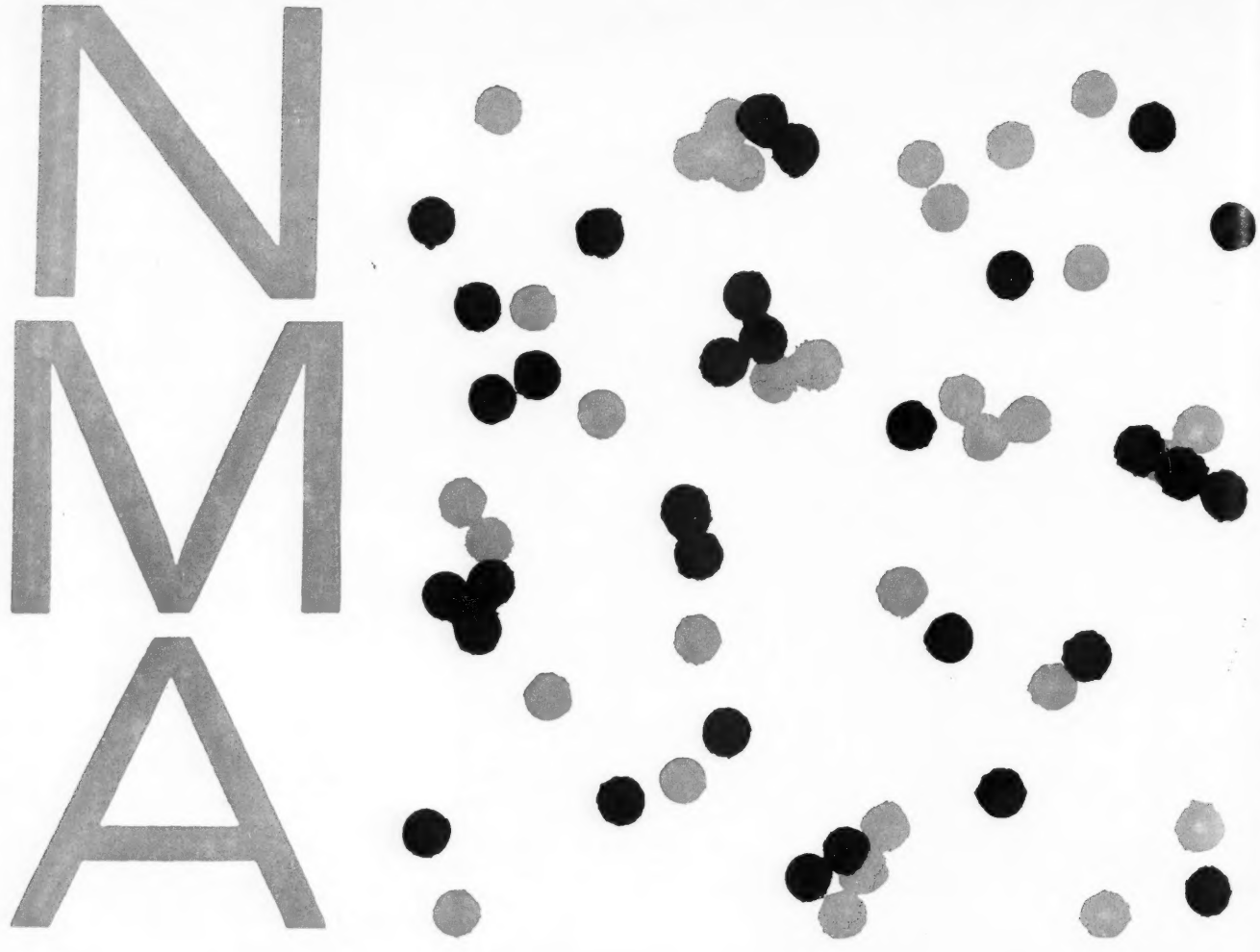


CONVENTION

Government officials, librarians, archivists, executives, technicians and microfilm manufacturers are among those converging on New York City for the ninth annual National Microfilm convention, April 19-21. Headquarters for the show is the Statler-Hilton where two floors have been reserved to accommodate 75 display booths and numerous meeting rooms. Systems, technology and applications are the themes of the three-day session. Complete details on speakers, topics and exhibits will be found on the opposite page.

April 19-21 meeting at the Statler-Hilton Hotel in New York City will feature technical papers, application studies and discussion panels.

● At the opening luncheon on Tuesday, April 19, Joseph F. Curtin, NMA president, will introduce the keynote speaker, General P. E. Ruestow of the USAF. Gen. Ruestow will outline the important role that unitized microfilm systems are now playing in Department of Defense contracts, invitations to bid, specifications and engineers drawings.

The first general session will begin Tuesday afternoon at 2:15 and will be titled "The Tools." It will feature a series of short papers describing new equipment and materials. Those on the program include Paul M. Slattery, Recordak Corp.; John R. Tackaberry, Photostat Corp., and Edward Freel of Datagraphic systems.

● Theme of the second general session on Wednesday morning will be "Department of Defense Specifications." A panel of seven government experts will participate in the discussion and a member of the American Standards Association will give the ASA interpretation of the new DOD standards. It is expected that copies of the military documents will be available for distribution at the Armed Forces convention booth. "Library Archival Problems" will be offered as an alternate second session. This program will cover microfilming uses in archives, libraries and educational institutions.

● "The Technology: Present and Future" is the topic to be covered in the third general session Wednesday afternoon. H. L. Carroll of International Business Machines Corp. will discuss "The Use of Microfilm Aperture Cards in IBM Equipment." Other speakers and their subjects include: Warren Novak, General Precision Labs, "Microfilm and TV"; D. J. Parker, Radio Corporation of America, "New Tools for Microrecording & Reproductions."

● The final general session on Thursday morning will deal with applications of microfilming in engineering, government, hospitals and in data processing systems. Among the speakers will be William Ward who will present "Microfilm Activities in the Government of Nassau County, N. Y. " Eugene Whitaker of the Connecticut Medical Service has selected "Retrieval in the Connecticut Blue Shield" as his topic. Both of these activities plus others outlined at the convention will be reprinted by NMA in the "Convention Proceedings" at an early date. Another talk of unusual interest, "Microfilm — Secret Agent", will be covered by Frank Bobb, formerly with the Office of Secret Service.

● Between sessions convention delegates can "window shop" in the exhibit area and view the latest microfilm equipment and supplies. A tentative list of exhibitors and their products include: Andrie Debrie, processing equipment; Anken Chemical, photographic reproduction papers and machines; Atlantic Microfilm Corp.; Burleigh Brooks, Rollei cameras; Canadian Applied Research, T246 Automatic Tri-Film Processor; Charles Bruning, Deagraph and Documat cameras; Cormac, Unibath for microfilm; Dexter Co., blueprint folder; Documat, camera; Durst, Micromat copy camera; Fairchild Industrial Products Div.; Graphic Microfilm Corp., equipment, Filmsort and Verifax products; Haloid Xerox, 1824 Xerox printer; Ideax, products of Fuji Photo Film Co.; Kalvar.

● Keuffel & Esser, MicroMaster 105mm; Macbeth Instrument, Macbeth Quantalog transmission densitometers; Microdealers, draftsmen readers; Microcard, Microcards; Minnesota Mining, Thermofaxes and Filmac reader-printers; N. B. Jackets, microfilm jackets and automatic filler; National Storage, underground record vaults; Photo Devices, equipment; Photostat, photocopy and offset duplicating equipment; Plastic Coating, Statigraphs and Statimats; Prestoseal, motion picture, magnetic film and microfilm splicers; Recordak; Remington Rand; Sertafilm, jacketed microfilm files, readers and projectors; Wheeldex & Simple, automatic aperture card files.

● Richard Batchelder, Graphic Microfilm Corp., is general chairman of the convention. Committee heads who have helped plan the three-day program include: D. W. McArthur, Filmsort Co., exhibits chairman; T. Wistar Brown, Microsurance, program chairman; R. A. Boylan, Microfilm Corp., awards chairman; C. Peter McColough, Haloid Xerox, publicity chairman. □

Automating Engineering Data

Add to security and space-saving a new reason for microfilming—automation.

Until recently most companies that turned to microfilm for help did so to solve security and/or space problems. However, the wedding of microfilm and punched cards has produced another reason. Now, more and more firms are using microfilm systems for the primary purpose of automating their engineering drawings.

The East Pittsburgh Division of Westinghouse Electric is among the industrial units which report substantial increases in the efficiency of engineering operations because of the adoption of a microfilm system.

Each year East Pittsburgh draftsmen prepare more than 30,000 new drawings and revise more than 54,000. Before the adoption of the microfilm system, 3000 daily requests for copies of engineering tracings accounted for a paper output of 20 million square feet a year. It was this tremendous volume of paperwork that prompted the firm's decision to install an automated engineering drawing system.

The Westinghouse system begins with an original engineering drawing on paper. It is sent to the Reproduction Department, where it is microfilmed twice.

This is the end of the line for the drawing. It now goes into semi-retirement in a security vault.

The exposed microfilm is sent to a commercial lab for processing. The East Pittsburgh Division has found it more efficient to utilize the 24-hour service of such an organization than to do the processing itself.

While the film is going through the processing stage, a list containing the necessary reference drawing codes is sent to the keypunch section, where an aperture card is prepared. Reference information, including date and microfilm roll number, is punched into the card and also printed along the top edge of the card. A second card is duplicated for each drawing.

The processed film and the punched cards are brought together at this point. One negative is mounted in the original card and the second negative in the duplicate card. The original cards are machine sorted by drawing number and then sent to the master files, where they are hand interfiled.

Duplicate cards are sorted by product code and sent to the various engineering departments involved. These cards are used to replace the standard "office" copy of a drawing under the old system.

The engineering departments are equipped with microfilm readers. When a draftsman wants to refer to a drawing, he goes to the card file, selects the right card and inserts it into a viewer. Instead of having a large number of sheets of paper to shuffle back and forth, as he refers from one drawing to another, he merely has to remove a card and insert another into the viewer.

Each time a drawing is changed, a new card replaces the old one. Files contain only the latest drawing information available.

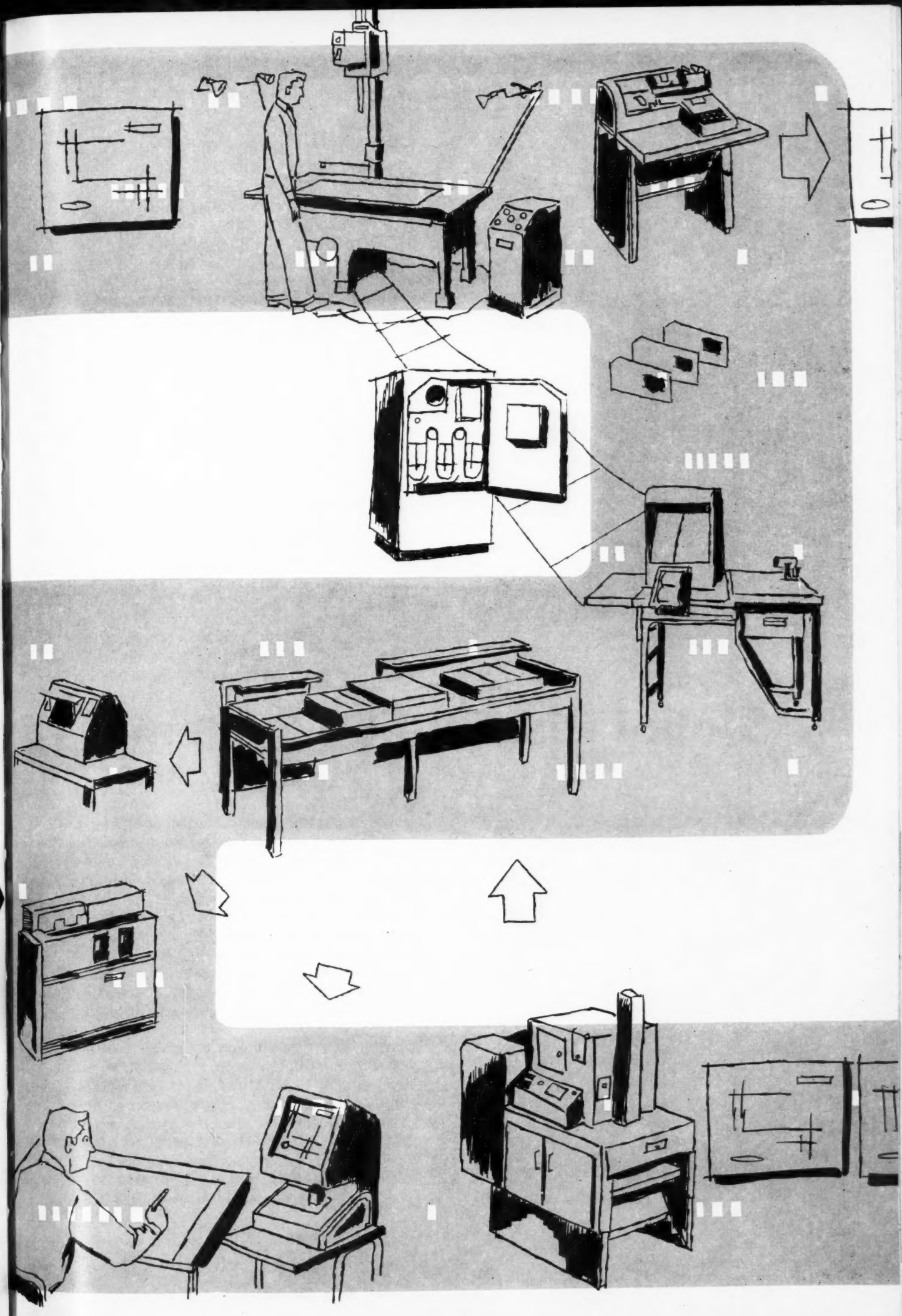
Requests for full-size drawings are forwarded to the master file, where the proper cards are selected. As rapidly as a workable batch is accumulated, it is sent to an automatic xerographic high speed printer for reproduction.

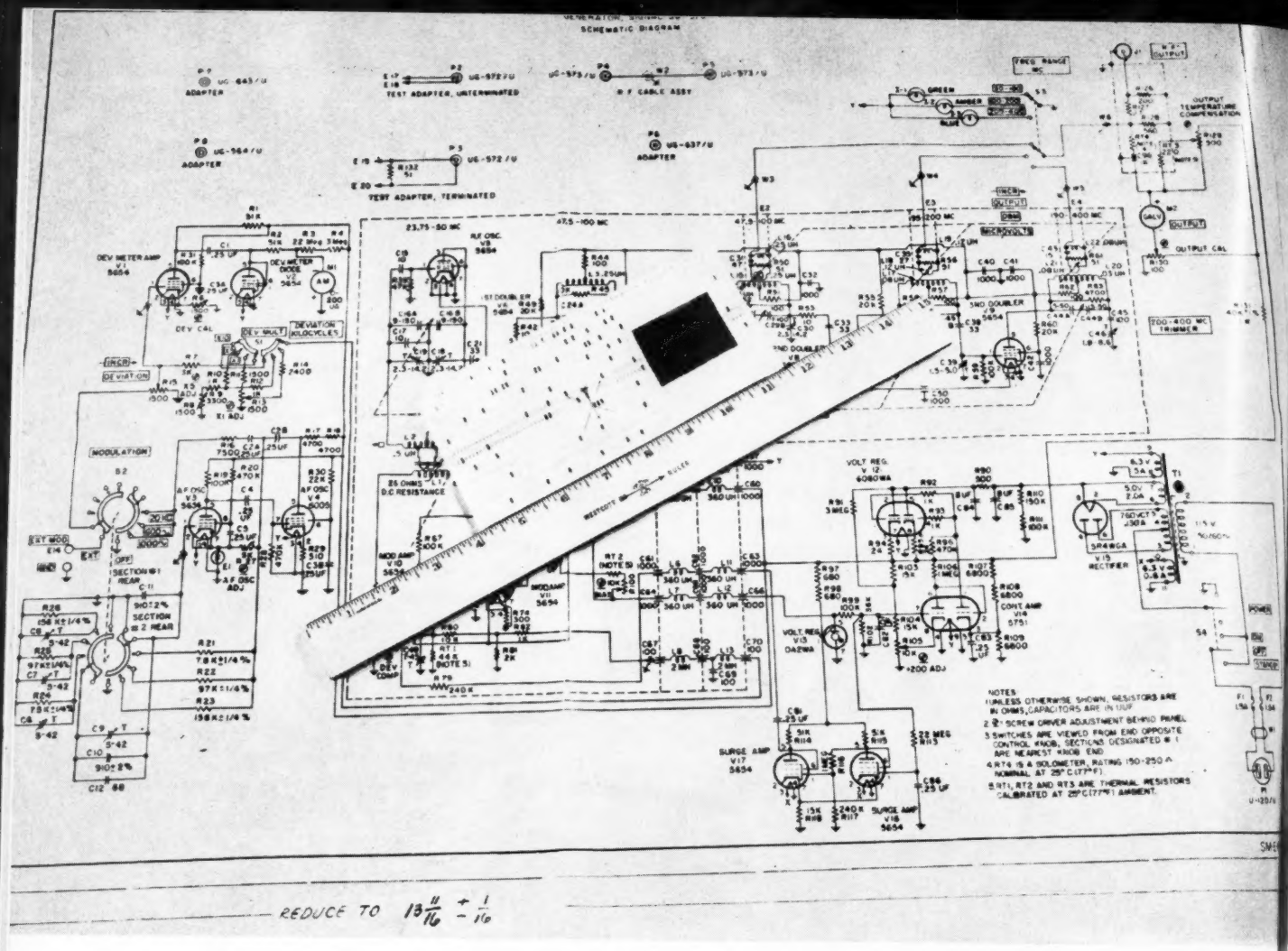
Comparative costs obtained from the Westinghouse operation indicate that a 24 x 30 drawing reproduced on the xerographic printer costs approximately 14 cents, compared to 18 cents on the standard black-and-white machine. An even bigger saving is possible when a copy of the aperture card is substituted for storing a full-sized print. The cost of duplicating a card is only five cents.

With this saving in mind, management encourages personnel to look at the duplicate cards on the viewer and request copies of drawings only when absolutely necessary. Such departments as accounting and purchasing are finding the card and viewer method faster and easier than requesting an actual print of the drawing.

Savings of $125,000 in preparing engineering drawings and a 10,500 square foot reduction in floor space were among the impressive first-year results of Westinghouse's automation program.

Westinghouse's experience with automated drawings has led company officials to predict that the time is fast coming when full-sized copies of engineering drawings will no longer be exchanged between customers, sub-contractors and other interested parties; rather, aperture cards with microfilm reductions of the drawings mounted on them will be the accepted method of engineering communications as far as tracings are concerned.





Global Distribution System

OPERATOR key-punches information into aperture cards.

1960 marks the centennial year of the U. S. Army Signal Corps and it also marks the year in which engineering data for 220,000 Signal Corps drawings and 400,000 manufacturers' drawings will be made available at world-wide locations of the Signal Corps. This remarkable accomplishment — involving the distribution of literally millions of items of information — is the result of an engineering communications system pioneered by the United States Army Signal Equipment Support Agency (USASESA).

The system combines unitized microfilm and punch cards for data processing and has already effected considerable savings in time, space and money for both the Armed Forces and civilian industry. Its applications promise even greater savings to come.

Basically, here is how the system is being organized:

It begins with the sorting of aperture cards for the hundreds of thousands of drawings into

an alpha-numeric sequence. Usually the drawing number is a combination of letters, symbols and numbers. Such letters, symbols and numbers can appear in almost any location in a pattern of 15 columns.

USASESA master data cards are created in film frame sequence. The sets of aperture cards, reproduced from these data cards, is in identical film frame sequence. The master data cards are also sorted into the desired alpha-numeric sequence. Once this sequence is accomplished, each card is assigned an accession number for its location in the desired alpha-numeric sequence.

Restored to Sequence

After the accession numbering process is completed the master data cards are restored to film frame sequence. In this sequence the accession number is reproduced into the aperture cards and simultaneously compared with the master data cards. To reach alpha-numeric sequence by manufacturer, the aperture cards are passed through a modified IBM 082 sorter. This entire operation is performed by an outside contractor, Recordak Corp.

The filming phase of the operation sees drawings grouped by size rather than alpha-numerically. All drawings are listed on a code sheet. Each line of the sheet represents both a film frame and a card. The code sheet is verified before the camera operation begins.

The drawings are filmed in listed sequence. While the film is being processed, a master data card is prepared for each line of the list. The sets of aperture cards for distribution are reproduced from the master data cards. The film and Filmsort aperture cards reach the optical mounter point where film and card data are verified prior to mounting.

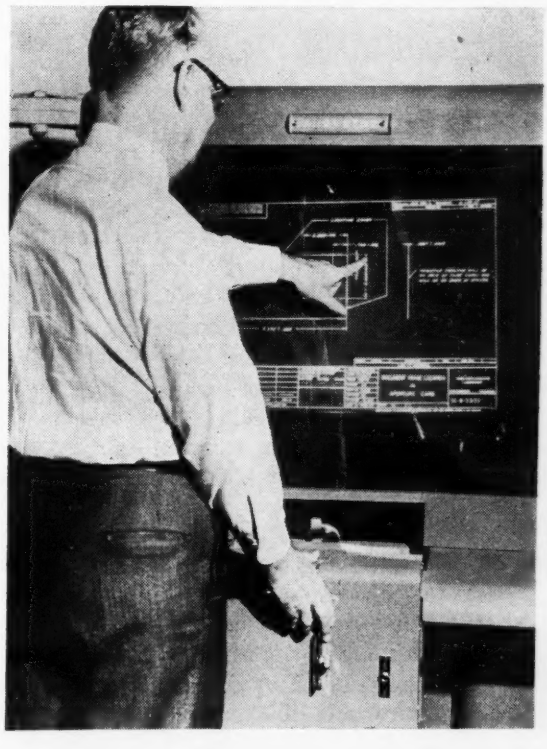
Individual sets are sorted into alpha-numeric file order. The master data card is used to tabulate shipping lists and all records of transmittal.

In the filming operation, two exposures are made for each frame. A positive intermediate is printed from the master camera film and the duplicate negative film is made from the intermediate. The sets are separated at the mounting point.

At the point of use — in this case the individual Signal Corps installations — film duplicates are made from the master aperture cards as an integral part of the entire engineering communications program. Individual engineers' requests are handled by duplicating the microfilm in the aperture cards onto diazotype blank film. This results in a "Duplicard" which facilitates file control since there are no "out" cards and

On arrival at Fort Monmouth, all engineering drawings are microfilmed on the base for ultimate mounting in aperture cards.

Engineer examines a key drawing in one of the many viewers strategically placed throughout the installation.



SMALL PORTION of the 400,000 manufacturers drawings and 200,000 Signal Corps drawings as they were formerly kept in blueprint form.

no cards waiting to be refiled. The dry duplicate film has another advantage in that it simplifies creating files for other uses.

Fantastic Savings

The overall savings are little short of fantastic. Under the former system of physically duplicating materials, it took six weeks from date of release approval to actual data distribution. Now it takes two weeks. Formerly it took as long as three days to furnish a print. Now it takes less than 90 seconds to deliver a reference "Duplicard" for instant projection.

The biggest savings, of course, have been in space and weight. For example, a Signal Corps field activity now only needs 15 standard file cabinets to hold aperture cards for 220,000 Signal Corps drawings, 400,000 manufacturers' drawings and an expected increment of 55,000 new and revised drawings. Almost 500 special filing cabinets would have been required for full-sized intermediates so the space savings ratio is 30 to 1. This also reflects itself in actual filing operations which are proven to be three-and-one half times faster.

The weight savings is a colossal 16 tons for each set of 400,000 drawings. This means more savings in the cost of shipping and distribution as well as storage.

Another important result of this new system is that all Signal Corps field offices can now have complete sets of data, something impossible previously. This will relieve strains and demands on central offices.

USASESA's pioneering of the conversion of full-sized originals and intermediates into aperture cards with optically mounted microfilm has been adopted by private industry and is now an accepted practice. To the Signal Corps it has provided the necessary simplicity in filing, retrieving and reproducing of data needed for practical world-wide distribution of micro-reproduced engineering data. The unitized microfilm/punch card system has cut the time lag between requisition and delivery and receipt and distribution.

Currently USASESA is working on other systems which may have equally far-reaching effects. As one of the first users of modified IBM equipment — reproducers, interpreters and sorters — for data processing, the agency is finding new uses for converted master data cards. Whereas its initial project was a system to furnish miniaturized reproducibles in punch cards, it is now finding uses for punch cards with and without apertures to improve engineering communication.

No one knows what tomorrow will bring in this fast-moving field but it is certain that USASESA will be among the first to take advantage of new methods, ideas and equipment. □

This article is based on material prepared by Mr. Francis R. Borden, Project Engineer, Signal Corps Engineering Data Microfilming Project.

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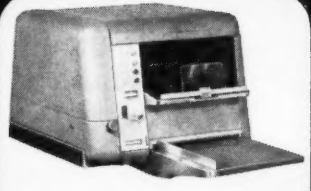
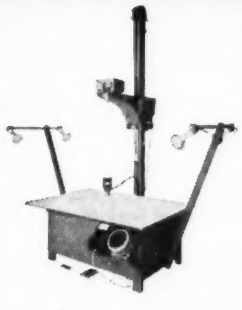
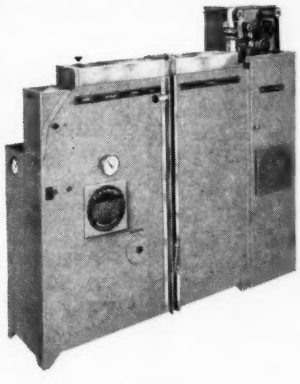


ARISTOCRAT Dual (16mm)



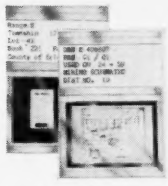
F36.1 Planetary

PROCESSING



UNIPRO

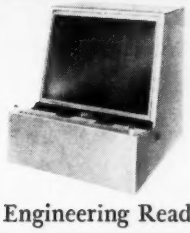
FILING



UNI-KARD

Jackets

READING



Engineering Reader

Electronic Reader

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CORMAC

CORMAC ANNOUNCES

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NEGATIVES AND PRINTS

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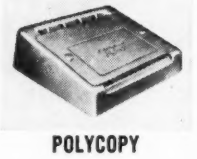
UNIKIT



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4. **GREATER PROCESSING CAPACITY.** UNIBATH CC-7 processes 20% more film area per gallon of working solution than conventional chemicals.
5. **NO FILM LOSS.** Films cannot be lost due to overdevelopment or underdevelopment. Results are identical whether left in UNIBATH CC-7 for 3 minutes or 3 hours.
6. **DENSITY CONTROL.** UNIBATH CC-7 has a built-in background density control (1.0 to 1.3) with no fall-off during entire length of use.
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Circle No. 8 on Post Card

FIRST STEP in policy application copying procedure is microfilming of documents on two planetary cameras.

CLEARER COPIES— LOWER COST

Life insurance company adopts microfilming techniques for application copying operation.

by JOSEPH S. BASEL
Superintendent, Policy Division
Equitable Life Assurance Society of the U. S.

The adaptation of advanced microfilming techniques to large-scale photocopy requirements is enabling Equitable Life to handle duplication of policy applications at considerable saving in cost. In addition, the new system we have devised is also making it possible for us to provide clients with sharper, more legible copies than in the past. This administrative improvement takes on its true proportions when it is kept in mind that we handle an average of 3,500 policy applications, part I and II, etc. every day.

Until recently, our Policy Issue and Service Department relied on conventional photocopying equipment to do the job. But this method left something to be desired. For one thing, we were able to produce only negative copies — white on black — and since these documents are handwritten, some of them in light blue or green ink and many on pastel-tinted paper stock, there was often a problem. Also, the copies were only 60 percent of original size, which made some hard to read. In addition, response to policyholder requests was not as speedy as we would have wished.

An extensive study was made of all available photocopy systems. We finally settled on a new process — the first of its kind to be adopted by any insurance office in the New York area — involving three basic pieces of equipment. These are the Remington Rand Planetary Microfilm Camera, the newly introduced Unipro film processor, and the Haloid Xerox printer — all of which function as integral parts of the copying system.

The Planetary Camera can film single documents or bound records up to 20″ x 24″ in size. It can be easily transported for convenient filming of documents at their location. Exposures of up to 45 documents or 90 pages of open, bound material can be made per minute.

The Unipro film processor is a self-contained unit which processes and dries 16mm, 35mm or 70mm film continuously or interchangeably without adjustment or special attachments, and it does this at the rate of 100 feet of film in 30 minutes. It can be threaded quickly and develops dye back, non-dye back, or positive film to meet the requirements of the National Bureau of Standards for archival permanence.

continued on next page

SECOND STEP: Microfilm is developed by Unipro film processor.

THIRD STEP is taken over by the printer, which automatically creates a positive copy of each microfilmed image on a continuous roll of ordinary paper stock.

As a result of the adoption of this copying system, we are now getting a sharp positive copy of every document in 195 percent of its original size, and at a substantial savings in operating cost.

Approved policy applications are routed to two Planetary Camera operators. They separate parts one and two from the application dossier, spread them under the overhead lens, and press a button. The operator can microfilm one application after another, as fast as he is able to handle the papers. The camera uses tinted-base 35mm film, its density ratio is such that it picks up the subtlest half-tones and shadings.

About 15 times during the day, the current spool of microfilm is removed from the camera and fed through the processor. Operating in normal room light, it automatically develops, fixes, washes, and dries the film in a single operation.

Each developed strip of film is then processed through the Haloid unit, which creates a positive reproduction. The copies are made five percent less than full size to facilitate their enclosure in the policies to be mailed, and their upper margins are cut extra large to allow space for stapling.

Service for All

In addition to its own policy application copying, our division has traditionally provided a cen-

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TOPICS

continued from page 8

meetings within the Department of Defense, and a further Defense-Industry meeting was called for March 7 — 11, 1960. The outcome of these meetings, when published, will have a great influence on all microfilming, whether for the government or not.

The amount of microfilm produced by institutional services does not equal, in quantity, that produced by the commercial labs; but it is an essential part of the research behind industrial and governmental development projects. The publication this year of a *Directory of Institutional Photoduplication Services in the United States* compiled for the American Library Association by Cosby Brinkley of the University of Chicago Libraries will assist research workers in acquiring the film that they need. It lists some seventy-seven laboratories that offer reasonably complete service, giving prices and other pertinent information in tabular form.

A *Guide to Microreproduction Equipment* was published by the National Microfilm Association at its Washington meeting in April 1959. This listed most of the equipment available in the United States. Since that time some new models have appeared, most of which will be included in supplements to the basic volume. Among these new items are: the Haloid-Xerox 1824 Printer, the Keuffel and Esser Kecofax electrostatic enlarger, the Recordak Portable Microfilmer, and a whole line of Japanese equipment distributed under the Dea-Graph line.

A final word should be given to an increasing interest in the microfiche (sheet microfilm) to be noted this year. The Kalvar Corporation has brought out their Kalvacard and Kalfile lines for the production of transparent sheets similar to the Ozalid Acti-

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Author Ernest P. Taubes

Choosing a Microfilm System

Ernest P. Taubes discusses the merits of 35mm, 70mm and 105mm as tools.

Engineering communications systems, and the mechanical tools these systems utilize, grow in importance daily. One such increasingly-important tool is microfilm.

Its importance is reflected by the present project of the U. S. Defense Department (Misc-0047) which is devoted to studying standards for microfilming systems. Specifically, the project deals with microfilming engineering documents and insertion of these microreproductions in aperture cards. Such a system, standardized and adopted, will enable the government to use microfilm actively in all types of activities from procurement to manufacturing processes.

As a result of this project, it is quite conceivable that the applications of microfilming to engineering communications may skyrocket in the foreseeable future. Therefore, it is quite timely to examine the state, advantages and limitations, of microfilm as it exists today.

Presently, three different film widths are being used in microfilm communications systems, 35mm, 70mm and 105mm. Each size has its own advantages and is suitable for a specific application which depends on the system's major requirement:

(1) Reducing engineering drawings to microfilm for easy and quickly available reference; or

(2) Use of the microfilm for reproductions either full size or reduced size, which in turn will be used for reference; or

(3) Use of the microfilm as a second original where full size reproductions will have to be reproduced.

Determining the proper film size for the microfilm/reproduction system depends on the final use of the film and under which of the three categories it falls. Other factors that enter into consideration are specific size of the drawing to be reduced, thickness of line, condition of the original material, etc.

The oldest microfilming systems employ 35mm film. It has one very big advantage; the film width and image size is small enough so that images can be separated and inserted into punch cards. This allows unitization in a form where automatic machine sorting of the required image is possible.

Thirty-five millimeter film also has the advantage of lower cost over the other two sizes and, therefore, currently is the most popular size for reproduction of engineering drawings.

It is most highly satisfactory as a reference system in which the quick location of a certain image is desirable and where the image will be used for direct viewing in a microfilm reader.

However, it also has limitations as to the quality of reproductions obtainable, particularly for engineering drawings of "E" size or larger and of drawings which have not been specifically prepared for microfilming. Properly prepared, engineering drawings produce excellent reduced size reference prints and in some instances full size reproductions that can be used as second originals.

Seventy millimeter is twice as wide as 35mm film and the image is more than four times as large in area. Thus, the reduction ratios to be employed for the same size document are less than one-half the reduction ratios for a corresponding 35mm image.

If the quality of film emulsion, lens and camera

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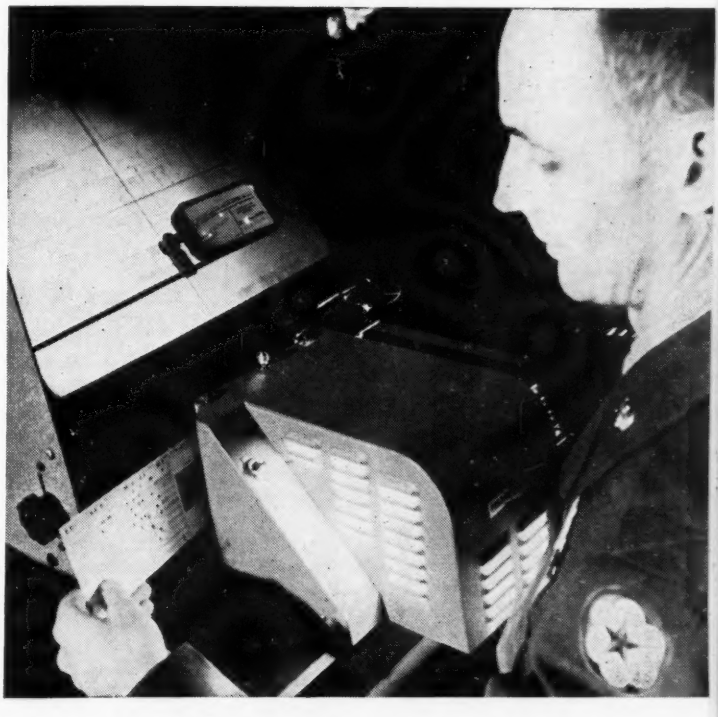

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CANADA

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TOPICS

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film. In last year's survey, the journal *Wildlife Disease* was noted as being published on Microcard. This year they are offering their subscribers a chance to vote on their preference for the transparent sheet or the opaque card. The Council on Library Resources has given a grant to Dr. Vernon Tate, Executive Secretary of the N. M. A., for an investigation centering about the construction of a working model of a device for producing microfiches. Time alone will tell whether the dominant form will be ribbon, sheet or paper card. The situation may remain just as it is now, with room for all three. □

NMA Officers

Officers of the National Microfilm Association for 1959-1960 include Joseph Curtin, president; Frederic Luther, vice-president; and C. Peter McColough, treasurer.

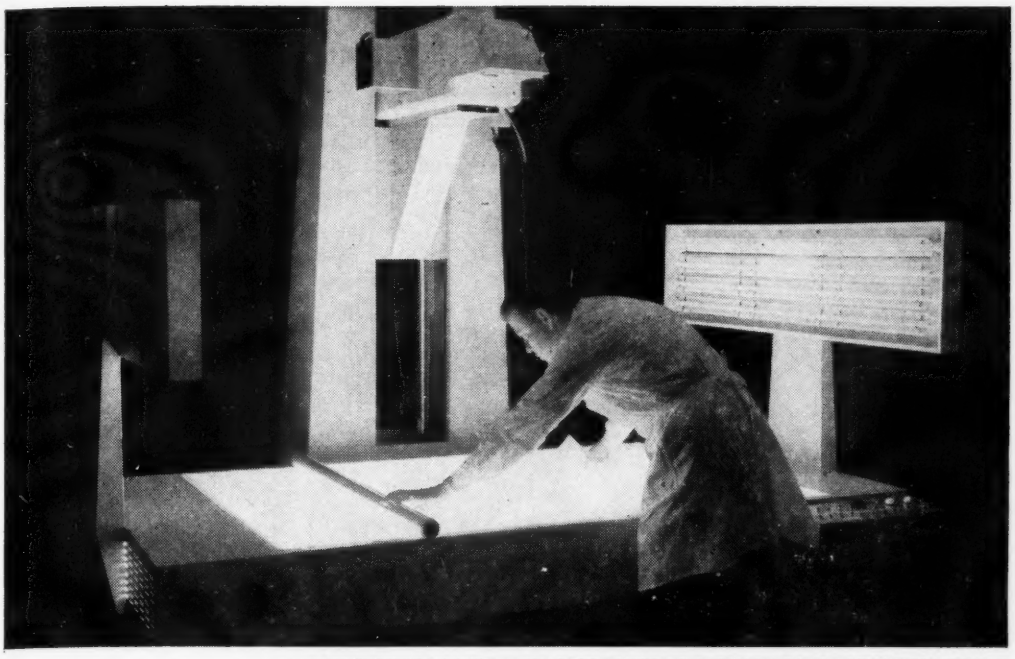
Serving on the Board of Directors are Robert A. Boylan, T. Wistar Brown, Charles Fennell, Hugh S. Fifield, D. W. McArthur and Carl Nelson.

CLEARER COPIES

continued from page 20

tralized photocopy service for all other home office departments. A study is now under way for a general changeover to the new process for this outside work as well.

The larger size and greatly increased clarity of the copy alone would be enough to justify our acceptance of this new system. That it enables us to provide a speedy response to policy-holder requests and do the job for considerably less money is so much to the good. □

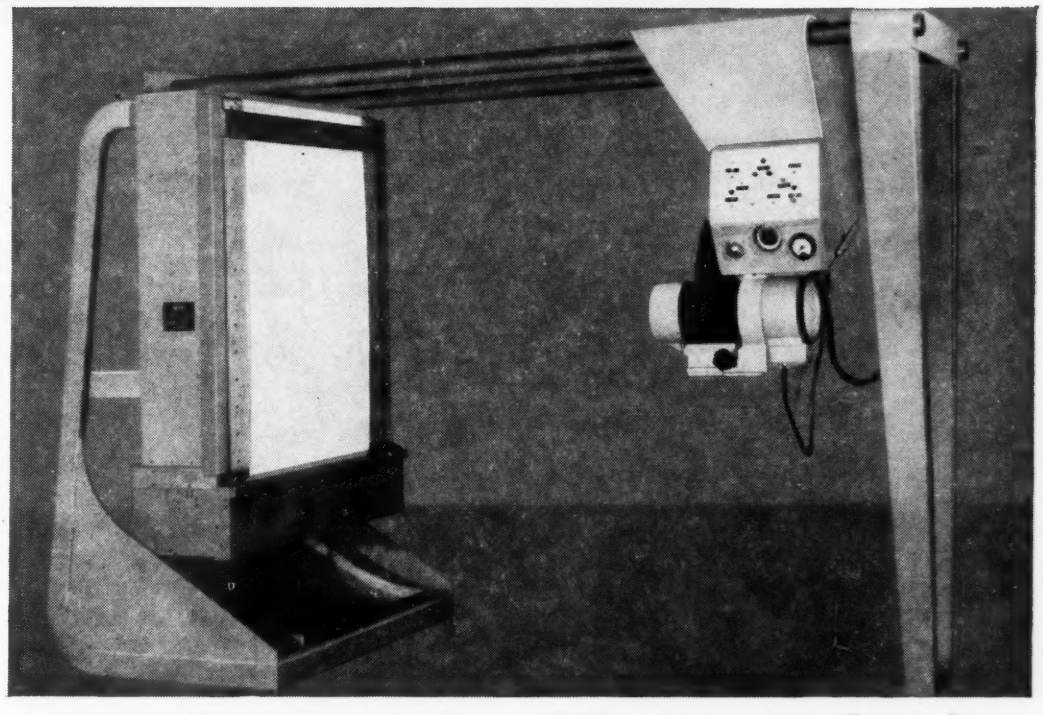


MICRO-MASTER®
105/35mm
Camera-Projector

A new K&E exclusive combines the two important miniaturization systems—105mm and 35mm—in a single, compact unit, permits tailoring of reproduction to the exact requirements of each job. Camera and projector are combined in a single overhead assembly with interchangeable magazines. Operator can shift from camera to projector, 105mm to 35mm, roll to sheet film, black and white to color . . . in seconds!

KECOFAX®
105/35mm
Projector-Printer

Now, for the first time, a unit that produces sharp, permanent, *work-size* electrostatic prints up to 34" x 48". From exposure to print in *40 seconds.* Delivers as many as 19 prints automatically. Process completely eliminates wet processing. Direct exposure onto electrically charged paper forms a latent electrostatic image by dissipating charges in the light struck areas...passage through toning and fusing chambers forms and permanently fixes a visible image.



2 Dynamic New Developments in Miniaturization of Engineering Drawings

Maximum performance and flexibility are yours in these new K&E units...

Miniaturization takes on a new dimension with the introduction of these two new K&E units—the basic components of a complete reproduction system engineered by K&E to provide maximum speed, accuracy and *flexibility* in miniaturization of engineering drawings.

For use in conjunction with your present equipment, or as the foundation of a complete new system, the MICRO-MASTER 105/35mm Camera-Projector and KECOFAX Projector-Printer working together provide both 105 and 35mm negatives and all sizes of prints required from full-size to any reduced size. Incorporating dozens of outstanding engineering firsts, these units represent an entirely new concept in effortless, *full-range* miniaturization . . .

For further details on these new K&E units, and the complete line of MICRO-MASTER and KECOFAX miniaturization equipment, send us the coupon to the right.

1519

KEUFFEL & ESSER CO., Dept. IP-4 Hoboken, N. J.

Please send me complete information on the ☐ MICRO-MASTER® 105/35mm Camera-Projector, ☐ KECOFAX® Electrostatic Projector-Printer, and allied Miniaturization equipment by K&E.

Name & title_____

Company & address_____

KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J. • DETROIT • CHICAGO
MILWAUKEE • ST. LOUIS • DALLAS • DENVER
SAN FRANCISCO • LOS ANGELES • SEATTLE • MONTREAL

Circle No. 22 on Post Card

APERTURE CARDS provide quick directions to Baltimore County's fire companies.

BALTIMORE FINDS A FASTER WAY TO FIGHT FIRES

With the flip of a microfilmed aperture card, men at the central headquarters of the Baltimore County Fire Department now can tell which district fire company is responsible for answering an alarm. More important, with this communications system headquarters can give these companies precise information on the shortest route to a fire, and the location of fire alarm boxes and hydrants.

Baltimore County sprawls over 615 square miles and surrounds, but doesn't include, the city of Baltimore. In 1951 thirty volunteer and paid fire companies banded to make a county department. Before consolidating, each of the companies had acted independently, receiving its own calls at the firehouse and servicing its own areas most of the time. Firemen knew all the roads in their own district by heart. With the introduction of a unified system it was necessary for firemen to venture into other districts, either to cover for companies out on fires or to assist in the actual firefighting. All calls for assistance came into central headquarters and from there were sent to the proper company by radio or direct-line telephone.

Those taking calls in the main office often lacked knowledge of county roads. It quickly became apparent that a system would have to be evolved to permit the new central headquarters to give immediate routing information to companies. After examining and discarding several complicated map systems Deputy Chief F. Lee Cockey and his associates turned to microfilm and aperture cards as a convenient way of making quantities of geographical information available quickly.

As an initial step, the county maps were divided into areas and then brought up-to-date. The areas were subdivided into sections which showed the specific area for which each company was responsible. Both sections and areas were microfilmed by the Recordak Corporation and mounted in aperture cards. Two sets of cards, which are brought up-to-date every six months, were made to permit cross-indexing by intersection and each card showed not only all roads and intersections, but also building numbers on each street. Also installed at main headquarters was a Filmsort Surveyer which is a reader with a 24x36-inch screen.

The aperture cards were tabbed alphabetically by areas and numerically by sections. At the same time a swivel card file was created which carried more complete data on areas, sections, and the order in which companies were to respond to alarms.

While the aperture card system was originally installed to assist in quick location of distant county points, Deputy Chief Cockey sees many additional possibilities. As funds become available he hopes to microfilm drawings of the interiors of large public buildings, industrial plants, schools, libraries, auditoriums, etc. showing electrical installations and cut-offs, water supply lines and controls as well as potential "hot spots" to be investigated immediately in case of fire. In the future, with the inclusion of this information it would be possible for a company commander at the scene of a fire to work with aperture cards, hand viewer and two-way radio system to direct the battle against a stubborn blaze right from the scene of the fire.

Proof that the microfilm setup has proved effective is in the lower fire insurance rates which Baltimore county residents pay. Then, too, fewer men are needed in the central office so the department is able to concentrate on more efficient use of personnel and equipment. "The potential uses of these systems are limitless," says Chief Cockey. "All that is required is the vision to see that potential and the funds to augment it." □

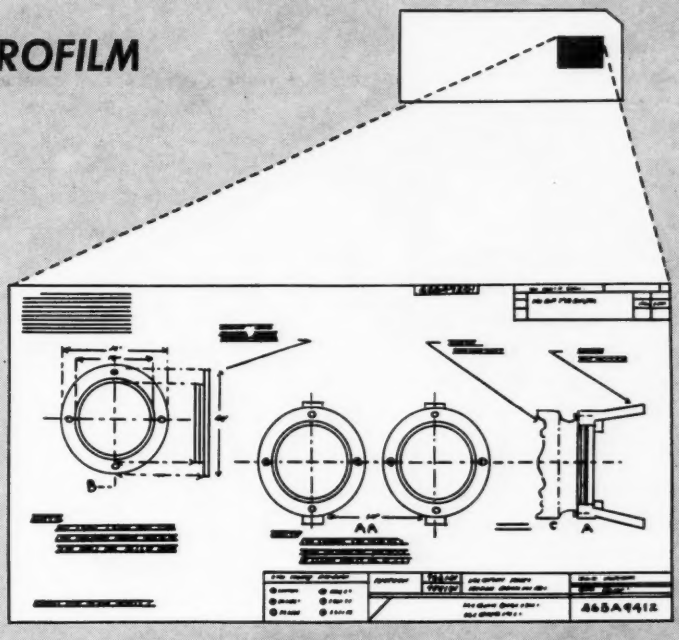
ANKEN PROJECTION MONO-COPY PAPER

takes you

from ***NEGATIVE MICROFILM***

to ***POSITIVE COPY***

in minutes



That's right! Make quick, inexpensive positive copies directly from negative microfilm, using Anken Projection Mono-Copy paper.

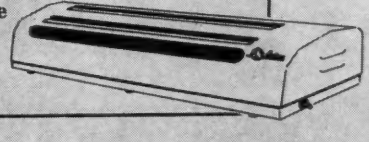
And the doing is easy! You expose in the normal manner on any standard enlarger; then develop in Anken's Monobath solution, using a machine processor of the Anken "27" type. *Eliminates the time-consuming, three-tray manual developing operation.*

The results? Perfect copies every time . . . no loss of detail. And Projection Mono-Copy is designed for use with all types of microfilm — in aperture cards, in strips, jackets, or on roll film — from all sizes to 105mm.

The Mono-Copy enlargements can be transparentized and used as intermediates for making diazo copies.

See
PROJECTION MONO-COPY
plus a full line of reproduction materials
at the Anken Booth (#11)
in the
National Microfilm Show
Hotel Statler-Hilton
New York City
April 18-20

The Anken "27" develops and stabilizes prints in one convenient, compact, double tray unit. Handles any size up to 27 inches wide by any length.



ANKEN FILM COMPANY
a wholly-owned Subsidiary of Anken Chemical & Film Corp.
Newton • New Jersey

Circle No. 3 on Post Card

Economy and Speed— Answers to A Bank's Needs

Drive-in banking operation depends on signature verification system geared to photocopy and microfilming techniques.

Probably the most important commodity that banking institutions have to sell is service — and satisfactory, profitable service in a competitive situation is usually only possible when a bank is efficiently organized. Therefore, it behooves bank officials to keep abreast of developments in the rapidly progressing world of systems. They must be alert to fast and economical internal procedures, which at the same time are accurate.

The Union National Bank of East St. Louis, Ill., is a dynamic bank in an equally dynamic industrial and agricultural community of approximately 90,000. To attract new customers and, at the same time, serve old ones better, the bank's policy makers decided to provide drive-in facilities and install a sidewalk teller — an excellent idea but one with a major hitch. To do so and verify signatures on personal checks under the existing system would have involved too much time. It would have been necessary for the teller to take the check to the accounting department in the basement of the bank, pull out the signature card, compare it and return to the teller's cage — an obvious impossibility with a drive-in operation. Then there was also the problem of checking savings and other accounts without leaving the depositor at the window for too long a time.

Studied CCTV

The bank's assistant vice-president, Paul Schlafly, investigated closed circuit television. He learned that just the installation of a CCTV system would cost about $5,000. In addition it would have been necessary to place at least one more employee on the payroll, a man able to keep the system in operation at all times.

So Schlafly turned away from closed circuit television and towards photocopying. A study revealed that not only would photocopying do the job, but it would do it without adding employees to the staff; also, the initial cost of the necessary equipment would run about half what the television equipment would have cost and maintenance costs would be negligible.

The System at Work

The first step was to provide copies of existing signatures. The signature cards, 48,695 of them, were microfilmed. From the negatives, two additional sets of all signature cards — regular checking accounts, thrifty checking accounts and savings accounts —

continued on page 44

Data Processing and
MICROFILMING
SYSTEMS

a directory of microfilm services

Beginning on this page you will find arranged alphabetically by states the names of companies offering a variety of microfilm services. The key numbers following each name refer to the services listed directly below. The directory is based on the answers to a questionnaire sent to microfilm service companies across the country. Where no key numbers appear, only the name and address of a company, it is because we had not received their answers by the time we went to press. We hope to be able to fill in any gaps that may exist in this directory in one of our later issues.

CAMERA WORK

1. Microfilm onto (a) 16mm (b) 35mm (c) 70mm (d) 105mm.
2. Use (a) planetary camera (b) rotary camera.
3. Placements offered: (a) Simplex (b) Duplex (c) Duo.
4. Reduction ratios available: (a) below 1/10 (b) 1/10 to 1/20 (c) above 1/20.
5. Do work (a) only in own plant (b) on location.
6. (a) Sell cameras. (b) Rent cameras. (c) Service cameras.

PROCESSING

7. Offer (a) 16mm (b) 35mm (c) 70mm (d) 105mm (e) continuous (f) rewind (g) reel & tank (h) spiral reel.
8. Test for archival permanence.
9. Sell film with processing.

PRINTING

10. Handle (a) 16mm (b) 35mm (c) 70mm (d) 105mm (e) silver (f) Kalvar (g) diazo duplicates.
11. Handle (a) roll to roll (b) roll to card (c) card to card (d) Micropaper (e) unitized Micropaper (Microstrip or Microtape).

ENLARGEMENTS

12. Enlarge from (a) 16mm (b) 35mm (c) 70mm (d) 105mm (e) aperture cards (f) sheet film (g) strips.
13. Use (a) continuous enlarger (b) step enlarger.
14. Enlarge by (a) silver (b) Xerox (c) electrofax (d) diazo.
15. Trim and bind prints.

CALIFORNIA

Bay Microfilm, Inc.
4009 Transport St.
Palo Alto
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abe, 8, 9, 10abeg, 11abce, 12-abeg, 13ab, 14ab, 15.

Branco's Graphic Art Service
439 Market St.
San Francisco
1abcd, 2ab, 3abc, 4abc, 5a, 7ab, 8, 9, 10abcde, 12abcdefg, 13b, 14ab, 15.

Charles R. Burks
2120 West Valley Blvd.
Alhambra
1ab, 2ab, 4abc, 5ab.

Mobile Microfilm Service Co.
1367 West Willow
Long Beach 10
1ab, 2ab, 3abc, 4bc, 5ab, 7abe, 8, 10abe, 11ab, 12abefg, 14ab, 15.

Producers Photographic Laboratory, Inc.
6556 Santa Monica Blvd.
Hollywood 38
1ab, 5a, 7abceg, 8, 10abcefg, 11a, 13b, 14a.

Westwood Blue Print Co.
2250 So. Barrington Ave.
Los Angeles 64
1abd, 2ab, 3a, 4abc, 5a, 7abdh, 8, 10be, 11ab, 12abcdefg, 13ab, 14ab, 15.

Keuffel & Esser Co.
1327 So. Olive St.
Los Angeles 15
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a, Reduction ratios: 3X-10X.

San Diego Engineers Supply Co.
1127 4th Ave.
San Diego 1
(same as above)

Blue Print Service Co.
3034 2nd St.
San Francisco 5
(same as above)

Royal Blue Reprographics Corp.
5221 Pacific St.
Huntington Park

Mark Larwood Corp.
737 Middlefield Road
Redwood City

Records Service Corp.
2429 W. Vernon Ave.
Los Angeles 8

Western Microfilm Co.
1045 Sansome St.
San Francisco

Microfilm Co. of California
1977 So. Los Angeles St.
Los Angeles

Microfilm Business Systems Co.
5810 West Adams Blvd.
Los Angeles 16
1abc, 2ab, 3abc, 4abc, 5b, 6abc, 7abceg, 8, 9, 10abcefg, 11abc, 12abefg, 13b, 14ab, 15.

COLORADO

Dakota Microfilm Service
9655 W. Colfax
Denver
1ab, 2ab, 3abc, 4abc, 5b, 6abc, 7abe, 8, 9, 10abcdefg, 11abcd, 12abefg, 13a, 14ab, 15.

CONNECTICUT

The American Microfilming Service Co.
44 Laura St.
New Haven 12
1ab, 2ab, 3abc, 4abc, 5ab, 6ac, 7abe, 8, 9, 10abe, 11de, 12abefg, 13b, 14a, 15.

DISTRICT OF COLUMBIA

J. Y. Hollingsworth Co.
1306 S. W. Washington
1b, 2a, 5a, 6a, 7bg, 10befg, 11abc, 12be, 13a, 14abd, 15. Reduction ratios: Continuous 1/6 to 1/30.

Graphic Microfilm Corp. of Washington
1106 20th St. N. W.

FLORIDA

Photo Arts
1429 N.W. 7th Ave.
Miami 36
1ab, 2ab, 3abc, 4bc, 5b, 10abcde, 12abcdefg, 13b, 14a, 15.

Dakota (Southern) Microfilm Service, Inc.
505 West Flagler St.
Miami

GEORGIA

Southeastern Films
179 Spring St., N.W.
Atlanta
1b, 2a, 3a, 4abc, 5ab. Process, print and enlarge only as part of contract.

ILLINOIS

Photo Copy Service
310 Park Ave.
Rockford
1abc, 2ab, 3a, 4bc, 5ab, 6ac, 7bch, 9, 10bce, 11a, 12abcefg, 13b, 14a.

Keuffel & Esser Co.
516-520 So. Dearborn St.
Chicago 5
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Western Blue Print Co.
2415 W. Peterson Ave.
Chicago
1ab, 2ab, 3c, 4bc, 5a, 6ac, 7bfg, 8, 9, 10beg, 11abcd, 12abcdefg, 13b, 14a, 15.

Watland, Inc.
7724 S. Claremont
Chicago 20
1abc, 2ab, 3abc, 4abc, 5ab, 6abc, 7abceh, 8, 9, 10abcefg, 11abcde, 12abcdefg, 13b, 14ab, 15.

Great Lakes Microfilm Co.
4075 So. Archer Ave.
Chicago 32
1abc, 2ab, 3abc, 4bc, 5ab, 6ab, 7abce, 8, 9, 10abceg, 11e, 12-abce, 13a, 14ab, 15.

Accurate Microfilm Service
118 S. Fourth St.
Springfield

INDIANA

The Frederick Luther Co.
2803 East 56th St.
Indianapolis
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abeh, 8, 9, 10abeg, 11abcde, 12abefg, 13ab, 14abd, 15.

Fort Wayne Microfilm Inc.
101 East Cal.
Fort Wayne

IOWA

Watland, Inc.
1901 E. University St.
Des Moines

(over)

LOUISIANA

New Orleans Blue Print & Supply Co.
824 Union St.
New Orleans 12
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Southern Microfilm Corp.
2301 Perdido St.
New Orleans
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abh, 8, 9, 10abefg, 11ab, 12-abeg, 13ab, 14ab, 15.

MARYLAND

Zepp Microfilm Service
3042 Greenmount Ave.
Baltimore
1ab, 2ab, 5b, 6b, 7abe, 9, 10-abcde, 12abefg, 14ab, 15.

MASSACHUSETTS

B. L. Makepeace, Inc.
1266 Boylston St.
Boston
1d, 2a, 5a, 6a, 7d, 8, 10d, 12d, 13b, 14a. Reduction ratios: 3X-10X.

General Microfilm Co.
100 Inman St.
Cambridge, Mass.
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abeg, 8, 9, 10abe, 11abe, 12abg, 13ab, 14ab, 15.

Graphic Microfilm Service & Equip.
1560 Trapelo Rd.
Waltham

Microdealers, Inc.
1560 Trapelo Rd.
Waltham
1ab, 2ab, 3abc, 4bc, 5ab, 6abc, 7abeg, 8, 9, 10abefg, 11abce, 12abeg, 13b, 14ab, 15.

MICHIGAN

Multi Color Co.
116 Delaware
Detroit 2
1d, 2a, 5a, 6a, 7d, 8, 10d, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Industrial Microfilm Co.
13157 Hamliton Ave.
Highland Park 3
1ab, 2ab, 3abc, 4abc, 5ab, 6ac, 7abce, 8, 9, 10abe, 11abde, 12-abeg, 13ab, 14a, 15.

Lowden Microfilm Service
607 Garfield St.
Jackson
1ab, 2ab, 3abc, 4abc, 5ab.

Specifications Service Co.
14877 Wyoming
Detroit 38
1a (rotary), b (planetary), 4c, 5b, 6ab, 7abf, 8, 9, 10abg, 11-abcde, 12abcdefg, 13b, 14a, 15.

Toaz Microfilm Service
506 N. Washington Ave.
Lansing 33, Mich.
1ab, 2ab, 3a, 4b, 5a, 7abe, 8, 9, 10abe, 11ae, 12abe, 13b, 14a, 15.

University Microfilms Inc.
313 N. First St.
Ann Arbor, Mich.
1abc, 2ab, 3ab, 4abc, 5ab, 6a, 7abce, 8, 9, 10abce, 11a, 12-abcdefg, 13b, 14ab 15

MINNESOTA

Dakota Microfilm Service, Inc.
501 North Dale St.
St. Paul

MISSOURI

Keuffel & Esser Co.
4931 Daggett Ave.
St. Louis 10
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Central Microfilm Service Corp.
1000 Washington Ave.
St. Louis 1
1ab, 2ab, 3abc, 4ac, 5ab, 6ab, 7abceg, 8, 9, 10abceg, 11ade, 12abcefg, 13a, 14ab, 15.

Western Blue Print Co.
909 Grand Ave.
Kansas City 6
1bd, 2a, 3a, 4abc, 5b, 6a, 7bdg, 8, 10bdeg, 11e, 12bdefg, 13b, 14a, 15.

Swank Microfilm Service
111 North Third St.
St. Louis 1

NEBRASKA

Standard Blue Print Co.
1411 Harney St.
Omaha
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Dakota Microfilm Service
701 South 24th Street
Omaha 2
1ab, 2ab, 3abc, 4abc, 5b, 6abc, 7abe, 8, 9, 10abefg, 11abc, 12abefg, 13b, 14ab, 15.

NEW JERSEY

Jersey Microfilm Service
48 No. 12th St.
Paterson 2
1ab, 2ab, 3abc, 4abc, 5b, 6a, 10abe, 12abeg, 13ab, 14ab, 15.

Microfilming Corp. of America
2 Llewellyn Ave.
Hawthorne
1abcd, 2ab, 3abc, 4abc, 5ab, 6abc, 7abcde, 8a, 9a, 10abcdeg, 11abcde, 12abcdefg, 13ab, 14ab, 15.

It's time for engineers to take

NEW YORK

Keuffel & Esser Co.
127 Fulton St.
New York
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Atlantic Microfilm Corp.
Pearl River
1ab, 2ab, 3ab, 4abc, 5a, 6abc, 7abe, 8, 9, 10abe, 11a, 12abg, 13b, 14a.

Microfilm Corp.
13 East 37th St.
New York 16
1abc, 2ab, 3abc, 4abc, 5ab, 6abc, 7abch, 8, 9, 10abceg, 11be, 12-abcefg, 13c, 14ab, 15.

Paul E. Killion, Inc.
80 Maiden Lane
Albany 7
1abc, 2ab, 3abc, 4ac, 5ab, 6bc, 7abcf, 8, 9, 10abc, 11abde, 12-abg, 13b, 14ab, 15.

Rochester Microfilm Co., Inc.
691-693 Titus Ave.
Rochester 17
1abc, 2ab, 3ab, 4abc, 5b, 6abc, 7abcegh, 8, 9, 10abce, 11ade, 12abcdeg 13b, 14ab.

Biel's Photocopy and Microfilm Service
1045 Ellicott Square Bldg.
Buffalo 3
1abc, 2ab, 3abc, 4abc, 5b, 6abc, 7abcefg, 8, 9, 10abcefg, 11abcde, 12abcefg, 13b, 14ab.

Both and Teall Microfilm Service
East Aurora

Graphic Microfilm Corp.
115 Liberty St.
New York

Rochester Microfilm Co.
691-93 Titus Ave.
Rochester 17

Hall & McChesney, Inc.
Court St. & Oswego Blvd.
Syracuse
1abc, 2ab, 3abc, 4bc, 5ab, 6abc, 7abcefh, 8, 9, 10abceg, 11abcde, 12abefg, 13ab, 14ab, 15.

NORTH CAROLINA

Mann Film Laboratories
626 S. Main St.
Winston-Salem
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abe, 8, 9, 10abe, 11abe, 12-abefg 13b, 14a, 15.

OHIO

Hills Co.
90 N. Front St.
Columbus 15
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

H. L. Kothe Co.
1608 E. 23rd St.
Cleveland 14
(same as above)

Toledo Blue Print & Paper
316 Superior St.
Toledo
(same as above)

Allied Microfilm Corp.
47 North Case Ave.
Akron 5
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abe, 8, 9, 10abce, 11abcd, 12abcefg, 13b, 14ab, 15.

Columbus Microfilm, Inc.
3178 Cleveland Ave.
Columbus 24
1abc, 2ab, 3abc, 4abc, 5b, 6ac, 7abh, 8a, 9a, 10abe, 11ae, 12-abeg 13b, 14ab, 15.

Metropolitan Microfilming Co.
1721 W. Galbraith Rd.
Cincinnati 39
1ab, 2ab, 3abc, 4abc, 5ab.

Micro Photo Inc.
1700 Shaw Ave.
Cleveland
1ab, 2ab, 3abc, 4bc, 5ab, 6abc, 7abe, 8, 9, 10abe, 11ae, 12abg, 13a, 14ab, 15.

Microfilm Mobile Service, Inc.
196 15 West Lake Rd.
Rocky River 16
1ab, 2b, 3b.

Plunkett and Brant, Inc.
221 Industrial Blvd.
Xenia, Ohio
1ab, 2ab, 4bc, 5b, 6ab, 7abef, 8, 9, 10abceg, 11abc, 12abefg, 13b, 14a, 15.

Regiscope-Toledo Co.
2930 Wayne St.
Toledo
1a, 2a, 3a, 4c, 5b, 6abc, 7ag, 8, 9, 10abcde, 12abcdefg, 13a, 14a.

Youngstown Microfilm Co.
903 Oak St.
Youngstown 6
1ab, 2ab, 3abc, 4bc, 5ab, 6abc, 7abeh, 8, 9, 10abeg, 11a, 12abeg, 13b, 14a, 15.

The Microfilm Corp.
1051 Power Ave.
Cleveland
1abc, 2abc, 3abc, 4abc, 5ab, 6abc, 7abcegh, 8, 9, 10abcefg, 11abcde, 12abcefg, 13b, 14ab, 15.

Toledo Microfilm Service
3842 Upton Ave.
Toledo

OKLAHOMA

M. O. Blood & Co.
117 W. 8th St.
Tulsa 19
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abeh, 8, 9, 10abe, 11a, 12abeg, 13ab, 14a, 15.

Triangle Blue Print & Supply Co.
314 So. Cincinnati
Tulsa
1bd, 2a, 3a, 4abc, 5a, 6a, 7bdg, 8, 10bdeg, 11abc, 12abcdefg, 13b, 14a, 15.

OREGON

Mark Larwood Co.
1037 S.W. Fifth Ave.
Portland

continued on page 39

a new look at microfilm

■ Today microfilm is an active partner to production machines in modern plants—and is just as busy. Today engineers, methods and procedure specialists, reproduction supervisors, and industrial management use microfilm to solve paperwork problems and speed production. ■ Microfilm makes wonderful things happen. It standardizes records and drawings. It speeds reference. It simplifies filing. It shrinks file space—because with microfilm aperture cards you file 100% of your material in 4% of the space. It improves security. It raises efficiency, lowers overhead. ■ The only thing you need to make microfilm active—usable daily—is a THERMO-FAX "Filmac 200" Reader-Printer. Developed by 3M research, "Filmac 200" Reader-Printers combine the functions of a reader and a printer in a single low cost unit. You read the film clearly on the big screen. When you want a print, just touch a button and in seconds you'll have a copy—enlarged up to 18 x 24 inches. ■ THERMO-FAX "Filmac 200" Reader-Printers in a reproduction department and at multiple point-of-use installations make microfilm practical for any industry. There are many "Filmac" Reader-Printers actively at work today in a variety of operations—saving time, money, and improving efficiency. We invite you to take a new look at microfilm now. Mail the coupon for a free copy of "Let's Take a Positive Look at Microfilm"... a twelve page booklet about microfilm at work.

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Circle No. 28 on Post Card

County Takes the Positive Approach to Microfilm

Deeds are recorded on prints prepared from microfilm and mounted on file cards for easy reference.

by JILL ENGLISH

Every deed filed since 1900 is on file at the county tax office in Wilmington, Delaware. These deeds, which number a staggering 200,000, are crucial to the charting of property maps which determine what each land owner in the county will be assessed. To keep full-sized reproductions of these records available for reference at the tax office would be an impossible task because of limited space. It would also pose an insurmountable distribution problem when fast service was required. To avoid these problems the deeds were formerly kept at various departments around the county.

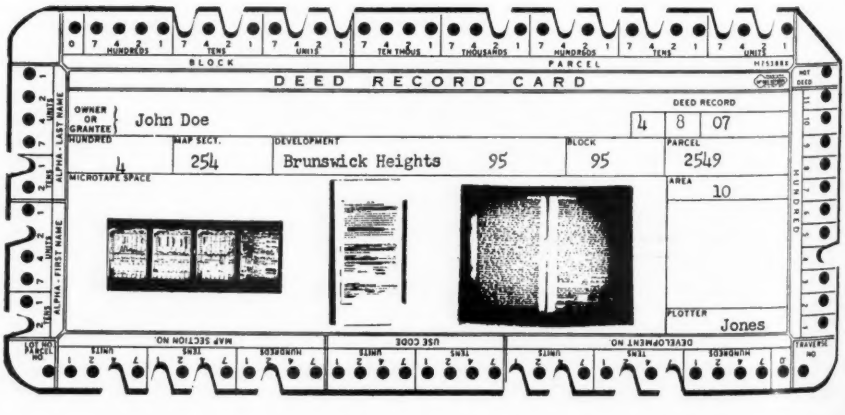
Three years ago county officials came up with a storage-retrieval system whereby these records could all be stored at the tax office and thus would be accessible to the engineers who draw the maps. The solution involved reproducing all records on Microtape film. Microtape is a positive print which is prepared from microfilm and has either 16 or 35mm dimensions. This material has a pressure-sensitive adhesive laminated to its back. By removing the adhesive the Microtape is easily applied to various kinds of file cards. In the case of the Wilmington tax office, county officials selected 3 3/10 x 7½-inch Royal McBee Filmsort cards which come notched for use in data processing machines.

Deeds first come to the deed recorder's office at Dover. There they are simultaneously Photostated and microfilmed for the public records. Then a set of the microfilmed deeds goes to the tax office and from there to the American Microfilming Service Co. in New Haven for microtaping and mounting onto cards.

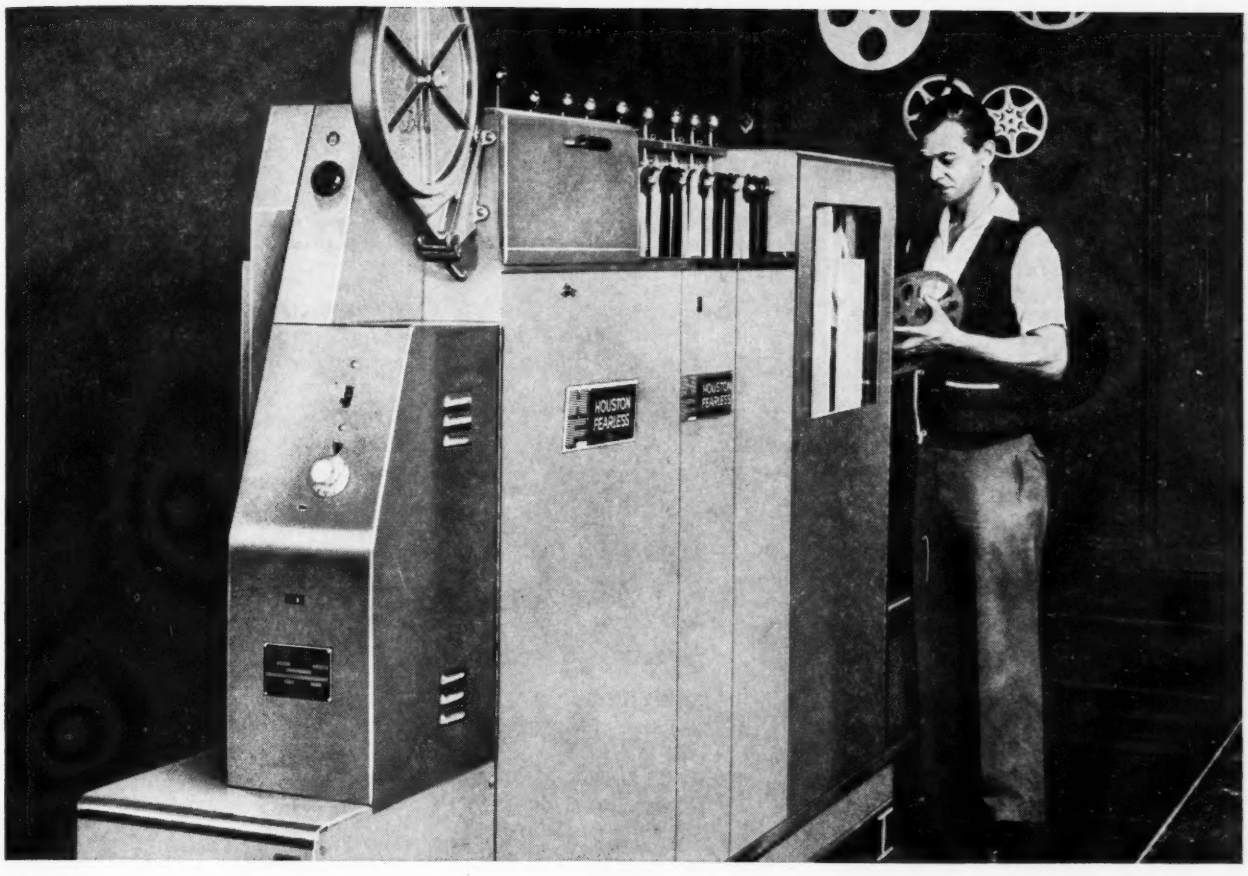
When the Filmsort cards return they are filed in metal drawers by county subdivisions. Cards in each subdivision are punched appropriately so that engineers have rapid access to the wanted deed either by location or alphabetically by owner. As yet the government has allotted no money for data recording equipment which could further mechanize the system.

Information is read from the cards with a reader made by the American Optical Company. The reader accepts both microfilm and Microtape, and in the case of Microtape provides a positive, easy-to-read image.

Assistant County Engineer John Cahalan has superintended the transferral of records to Microtape since the operation began and expresses satisfaction with the new system. Among the advantages he cites for the winning Keysort/Microtape combination are: (1) an original Microtape which is readable, (2) a reproduction which can be mounted and removed from the card without special equipment, and (3) a card with a large area for recording the quantity of data which must accompany each deed. □



DEED RECORD CARD of the type on file at the county tax office in Wilmington, Del. Such cards make possible a swift storage-retrieval system.



COUNTY PROCESSES OWN MICROFILM FOR QUALITY CONTROL AND FASTER SERVICE

Los Angeles County is one of many municipalities to discover the benefits in processing its own microfilm with a Houston Fearless Labmaster*. According to Ray Lee, County Recorder, in-office processing makes filmed documents available for viewing days sooner, while giving his office complete, accurate control over image quality.

Because the microfilm Labmaster is completely automatic, one technician can process the entire day's flow of documents with uniform high quality results. The unit is designed for easy operation in a fully-lighted room. Compact, completely self-contained, it includes an air compressor,* refrigeration system and archival unit for absolute film permanency. Priced to pay for itself from savings in processing costs.

Numerous banks, insurance companies, and other business firms are reaping benefits daily by processing their own microfilm. Send now for details including attractive leasing plan.

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We'd like more information on the advantages of processing our own microfilm. Send catalog and prices on Microfilm Labmaster. ☐ Furnish details on leasing plan.

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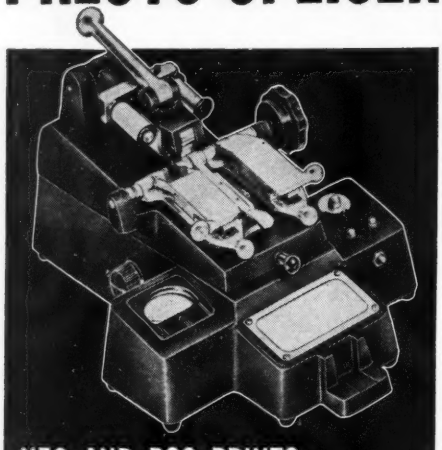

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Splices negatives and positives end-to-end on the frame-line, without the loss of a single frame. No overlap, no added thickness. Does away with A-B print matching. Does not throw sound track print out of synch.

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In any application calling for the precision splicing of 16mm, 35mm or 70mm polyester-base or safety-base film, PRESTO-SPLICER is the only answer.

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37-27 33 Street, L. I. C. 1, N. Y.
Export: Reeves Equipment Corp.
P. O. Box 171, Pelham, N. Y.

Circle No. 34 on Post Card

Yours for the Asking

New free literature on the latest development in the data processing and microfilming fields. Each item listed has a key number. For more information circle that same number on the Readers Inquiry Card.

CARDS

Microcards 901

Microtape Systems. This informative 16-page brochure defines Microcards and outlines the various uses of these cards in industry, government and education.

Filmsort Products 902

Filmsort Co. 16-page brochure written in an informative and readable style describes line of Filmsort cards and machinery.

Aperture Cards 903

Remington Rand. Pictures plus descriptions of a complete line of jackets and aperture cards for unitizing your microfilm images.

Unitization 904

Microcard Corp. Literature tells how microcards make reference data instantly available to you.

FILMS & DARKROOM EQUIPMENT

Anhydrous Hypo Material 906

Philip A. Hunt. Learn why this chemical is superior to rice crystals for use in film processing.

Xerox Copyflo 907

Micro Photo, Inc. Description of the Copyflo printer which produces copies of 16mm or 35mm microfilm on a continuous roll of paper.

Microfilm 908

Bell & Howell. Data on B&H Negative Type 1B microfilm including film speed, color sensitivity, filter factors and resolving power.

Engineering Repro Film 909

DuPont. Data on the Cronaflex line of reproduction materials. These films provide positive, black-line copies.

Microfilm Enlarger 910

Durst. Illustrations of the Durst M35, a precision enlarger for microfilm work.

CC-7 Developer/Fixer 911

Cormac Chemical Corp. Information for users of Unibath CC-7 combined developer/fixer for negative-type microfilm.

Dry Process Equipment 912

Kalvar Corp. Data on Microfilm enlargers, cameras and roll-to-roll printers. Chemical processing not required.

Fuji Microfilm 913

Ideax Corp. Brochure gives specifications on Fuji negative and positive microfilm.

Microfilm Accessories 914

Atlantic Microfilm Corp. Sales catalog describes the various products manufactured by Atlantic.

READERS

Universal Reader 915

Documat, Inc. Description of a microfilm reader for both roll film and unitized film.

Microfilm Reader 916

Erban Products, Inc. Flyer on enlarged version of portable reader for micro-records of newspapers, financial records, maps.

PROCESSORS

Film Processor 917

Houston Fearless. Close-up photos of working parts add interest to this brochure which describes the HF 16mm or comb. 16/35mm microfilm processor.

Processing Machine 918

EDL Co. Specifications on a new microfilm processor.

Mini-Rapid Processors 919

Fairchild Camera & Instrument Co. Booklet describes Fairchild's line of processors with leaderless film delivery.

Aiglenne America 920

continued on page 35

FOR THE ASKING

continued from page 32

Andre Debrie. Specifications on the Model America processor which replenishes automatically for constant density.

Microfilm Processor **921**

Canadian Applied Research. Price list on various film processors which accept microfilm.

ACCESSORIES

Automatic Microfiller **922**

NB Microjacket Corp. Details on a machine for speedily inserting microfilm in jackets.

Splicer **923**

Prestoseal Mfg. Corp. How to obtain splices with your microfilm by using the butt-weld method.

SERVICES

Copyflo **925**

General Microfilm Co. Information on the only commercial Haloid Xerox Copyflo installation in New England.

Microfilm Facilities **926**

Microdealers. Folder describes nationwide services of this company which includes microfilming of engineers drawings, public records, etc.

Microfilm Services **927**

Microsurance. Leaflet details the wide range of services offered by this company.

Microfilming Company **928**

Central Microfilm Service Corp. Folder shows graphically the various microfilm services available under one roof at this company.

Microfilming Facilities **929**

Micrecord Corp. Itemized list of all the microfilm services offered by this company including use of Micrecord Universal Microfilm.

SYSTEMS

Record-Stack **931**

Remington Rand. Folder tells you how you can design your own files

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Los Angeles 25, Calif.
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for holding microfilmed cards.

MCA Tour **932**

Microfilming Corp. of America. A candid tour of MCA's laboratory shows how you can save time, space and money in records program.

Microfilm Article **933**

Minnesota Mining & Manufacturing. Reprint of an article "Let's Take a Positive Look At Microfilm" which describes microfilm's uses in industry.

Planning a System **934**

Charles Bruning. A guide titled "Basic Microfilm Indexing and Filing Techniques" tells how to achieve maximum results from a microfilm system.

Automatic Xerography **935**

Haloid Xerox. Learn how you can reduce space taken up by engineering drawings by 95 per cent with the Haloid Xerox unitized system.

105mm **936**

Keuffel & Esser Co. Illustrated folder describes features of Micro-Master 105mm photo reproduction system for engineering drawings.

PHOTOCOPIERS & CAMERAS

Reproduction of Lists **938**

Recordak. Explanation of the Listomatic camera which expedites the repetitive printing of continuously changing catalogue-type data.

Auto-Stat **939**

American Photocopy Equipment Co. Information and illustrations on new one-step copymaker with automatic control.

Portable Microfilmer **940**

Recordak. Flyer with colored pictures plus data on the Recordak portable microfilmer with a 20 to 1 reduction ratio.

Photostat Photocopiers **941**

Photostat Corp. Specifications on Photostat #2 Standard, #2 Special and #4 Standard Photostat copiers.

Magazine Camera **942**

Photo Devices. Data on the model PD1100, a 35mm microfilm camera with removable magazine and 100′ capacity.

Anken 27 **943**

Anken Film Co. Details on the Anken 27 processor which makes all-purpose, single-solution copies up to 27 inches wide. □

NEW PRODUCTS

continued from page 4

Unibath System **811**

Cormac Chemical Corporation, which has been making news in the photographic field with its one-solution system of processing chemicals, has entered the microfilm field. Cormac's contribution is a complete UNIBATH system of processing. The components of the system include UNIBATH CC-7, a single-solution processor for all negative-type microfilms; UNIDRI, a rapid film drying and conditioning agent; UNIKIT, a complete portable darkroom for field processing; and POLYCOPY, an accessory which permits reproduction of microfilm images.

Sketching Tissue **812**

A lightly tinted yellow sketching tissue that permits low-cost reproduction is now available from **Keuffel & Esser Co.** Designed primarily for quick roughs and idea sketches, the #185 tissue is an inexpensive paper that takes pencil, charcoal or crayon. It will produce sharp copies on standard diazo, blueprint or office copy machines. The tissue is available in 50-yard rolls, 42 and 48 inches wide.

Diazo Copy Machine **813**

A new dry-diazo copy machine called the ROCKETTE has been announced by **Paragon-Revolute.** The ROCKETTE makes professional quality low-cost copies of drawings, tracings or printed matter and accepts material up to 42 inches wide by any length at speeds up to 15 feet per minute. Full development at top speed is made possible by the machine's patented stainless steel perforated rollers. Developer vapors pass through these perforations and are applied across the entire print surface with maximum uniformity. Finished prints are delivered to the front of the machine into a 12-inch tray. Power requirement for the ROCKETTE are 200-volt single phase 60 cycle current.

Projection Paper **814**

PEERLESS PROJECTION B EMULSION, a slow-speed projection emulsion designed for microfilm enlargements, template reproduction and similar applications has been announced in a variety of new base stocks by **Peerless Photo Products.** In addition to the present cloth and vellum bases the emulsion is now coated on 100 per cent rag stock and alpha sulfite paper. On the rag stock base prints of relatively high translucency may be ob-

continued on page 40

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Standards for Microfilming (continued from p. 21)

were the same in both 35mm and 70mm, the quality of the image produced on 70mm should be at least twice as good as 35mm. Actually, the best lenses available for 35mm are sharper so that the quality advantage is only 30-40 per cent. This is still sufficient to make reproductions from 70mm at its best quite a bit better than reproductions from 35mm.

YIELDS BETTER REPRODUCTIONS

An advantage of 70mm that must be considered is that 70mm will yield far better reproductions if the microfilm image may have to take the place of the original, and if the originals are "D" size or larger and in not-too-excellent shape. Its major disadvantage is that it is not designed for punch card systems as is 35mm. It can be unitized by filing in 3″ x 5″ opaque or transparent envelopes but it is not as convenient as key sorting. (Ed. Note: *major manufacturers have programs underway for mounting 70mm on aperture cards. However, these are not in wide use to date.*)

Now we come to 105mm. Calling 105mm a microfilm medium appears to me a misnomer since the use of 105mm is not related to any of the applications microfilm is put to outside of the production of second originals. Also, the actual film used in 105mm is not microfilm but lithographic film. Truly it is a reproduction medium and finds its best use where the second original to be produced from 105mm has to be able to do everything the original could.

Compare 105mm with 35mm and you find that the film is three times as wide and the image is nearly four times as long as 35mm. This means the image's actual area is 12 times as great as a 35mm image.

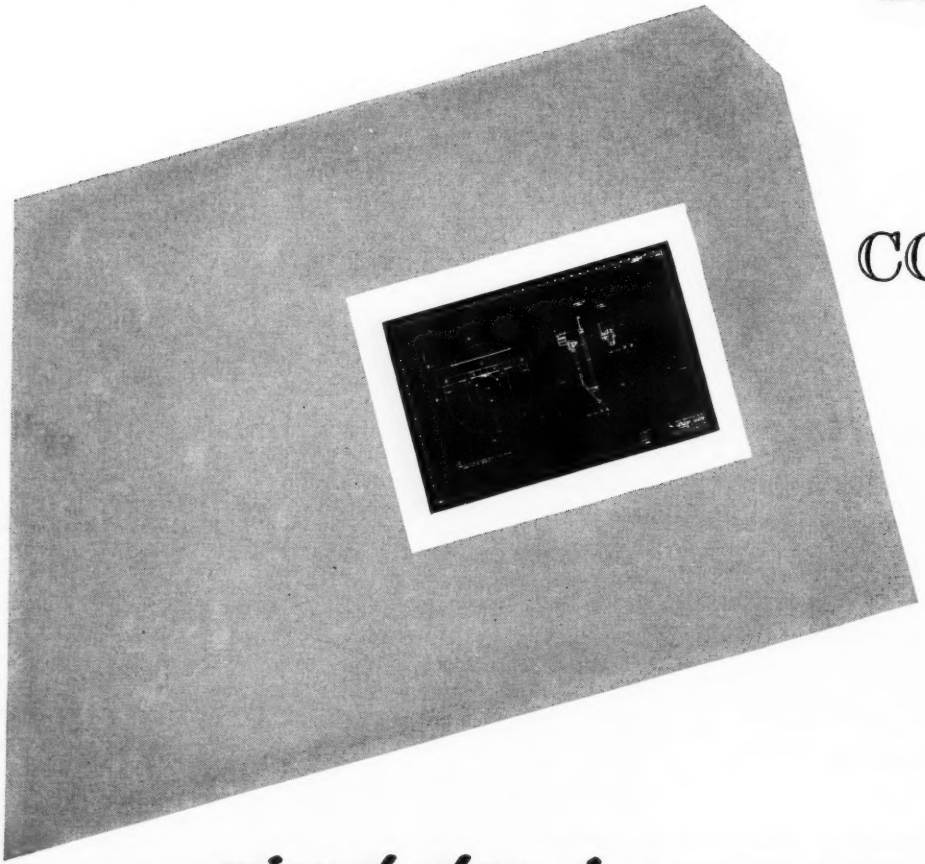
The film's lithographic emulsion combined with new dimensionally-stable film bases enables it to produce dimensionally accurate reproductions from the film to 1/50 of one per cent of the original.

COPIES IN SINGLE EXPOSURE

Other advantages of 105mm are that it allows the copying of large size drawings in a single exposure, it can produce full size originals which can undergo additional photographic processes without loss of definition, it offers images large enough to be satisfactorily retouched and which generally lend themselves to all the manipulations of a full size copy negative. It can be unitized or used as an individual image and fits either

continued on page 41

MICRODEALER Service Includes:



CONQUERING

HOME OFFICE **microdealers, inc.** 1560 TRAPELO ROAD • WALTHAM 54, MASSACHUSETTS

MICROFILM SERVICES DIRECTORY

continued from page 29

1b, 2a, 4ac, 5a, 6abc, 7bfh, 8, 9, 10abeg, 11a, 12ab, 13ab, 14ab, 15.

PENNSYLVANIA

Atlas Microfilming Service
105 N. Fifth St.
Philadelphia 6
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abe, 8, 9, 10abe, 11a, 12abefg, 13ab, 14ab, 15.

Microfilm Corp. of Penna.
6116 Centre Ave.
Pittsburgh 6
1abc, 2ab, 3ab, 4bc, 5b, 6ac, 7abce, 8, 9, 10abce, 11a, 12-abcdefg, 13b, 14a.

Microsurance Inc.
1422 Chestnut St.
Philadelphia 2
1ab, 2ab, 3abc, 4abc, 5b, 6ab, 7abeg, 8,9, 10abefg, 11ae, 12-abeg 13ab, 14ab, 15.

B. K. Elliott Co.
536 Penn Ave.
Pittsburgh 22
1ab, 2ab, 3a, 4bc, 5ab, 6b, 7abf, 10abcdeg, 11bc, 12abcdefg, 13b, 14a, 15.

TENNESSEE

Knoxville Blue Print & Supply Co.
614 Western Ave.
Knoxville

Richard Teague Mobile Microfilming
P. O. Box 101
Nashville
1ab, 2ab, 3abc, 4abc, 5ab.

Microfax, Inc.
125 Arnold Hotel Bldg.
Knoxville

TEXAS

Keuffel & Esser
2211 Pacific Ave.
Dallas
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Jones Graphic Products of Texas, Inc.
P. O. Box 185
El Paso
1ab, 2ab, 4bc, 5ab, 6abc, 7abh, 8, 9, 10abe, 11ad, 12abefg, 13b, 14a, 15.

Microfilm Service & Sales Co.
P. O. Box 8066
Dallas
1ab, 2ab, 3abc, 4bc, 5ab, 6abc, 7abe, 8, 9, 10abc, 11ae, 12ab, 13ab, 14ab, 15.

Triangle Reproductions, Inc.
4808 So. Main
Houston 2
1d, 2a, 3c, 4b, 5a, 6a, 7dg, 8, 9, 10deg, 12bcd, 13a, 14a, 15.

Darrel W. Smith Co.
2004 Community Lane
Midland

Southern Microfilm Corp.
3725 Revere St.
Houston
1ab, 2ab, 3abc, 4abc, 5ab, 6abc, 7abfh, 8, 9, 10abeg, 11abc, 12ab efg, 13ab, 14ab, 15.

UTAH

Universal Microfilming Corp.
141 Pierpont Avenue
Salt Lake City 1
1ab, 2ab, 3abc, 4abc, 5a, 6abc, 7abeh, 8, 9, 10abeg, 11abce, 12 abefg, 13b, 14ab, 15.

VIRGINIA

Cooper-Trent Microfilm Corp.
2701 Wilson Blvd.
Arlington 1
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d, 13b, 14a. Reduction ratios: 3X-10X.

Logan Gray Studios, Inc.
54 W. Main St.
Martinsville, Va.
1ab, 2ab, 3ac, 4bc, 5ab, 6a, 7abf, 8, 9, 10abe, 11ab, 12ab, 13ab, 14a, 15.

WASHINGTON

Seattle Art & Photo Supply Inc.
616-8th Ave. So.
Seattle
1b, 2a, 4c, 5a, 6a, 7ab, 10bfg, 11abc, 12befg, 13b, 14a.

Superior Blue Print Co.
1922-4th Ave.
Seattle 1
1d, 2a, 3a, 4a, 5a, 8, 10deg, 12abcdefg, 13b, 14a, 15.

WEST VIRGINIA

Microflim Service Co.
10 Arlington Ave.
Charleston 2
1ab, 2ab, 3ab, 4bc, 5ab, 7abg, 8, 10abeg, 11ade, 12abe, 13b, 14a.

WISCONSIN

M & S Microfilm Service, Inc.
205 West Highland Ave.
Milwaukee 3
1abc, 2ab, 3abc, 4abc, 5ab, 6ac, 7a (continuous), b, c (reel & tank), 8, 9, 10abefg, 11abcde, 12abcdefg, 13ab, 14ab, 15.

CANADA

Calgary Drafting & B/P Co., Ltd.
615-8th Ave., West
Calgary, Alberta
1d, 2a, 5a, 6a, 7d, 8, 10de, 12d,

continued on page 48

Microfilm-Processing • Duplication • Indexing • Storage • Filmsort Systems • Paper Reproductions

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DAKOTA SOUTHERN MICROFILM SERVICE, INC.
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New York 6, New York

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Farmingdale, New York

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Washington 25, D. C.

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Syracuse, New York

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Cleveland 14, Ohio

THE MICROFILM CORPORATION
Cincinnati 13, Ohio

SOUTHERN MICROFILM CORPORATION
New Orleans 19, Louisiana

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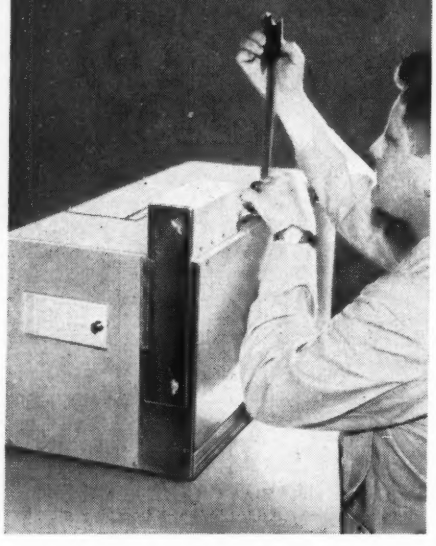
Houston 6, Texas

WATLAND, INC.
Chicago 20, Illinois

WESTERN MICROFILM COMPANY
San Francisco 11, California

Circle No. 25 on Post Card

FAIRCHILD MINI-RAPID PROCESSORS



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- **Leaderless daylight loading**
- **See first frames in minutes**
- **Self-contained, self-threading**
- **Table-top compactness**
- **Accurate chemical temperature control**

Get immediate evaluation of your 16mm or 35mm films with time-saving Mini-Rapid Processors. Leaderless delivery of processed film lets you see first few frames of negative image in minutes, make needed adjustments for exposure variables.

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NEW PRODUCTS

continued from page 36

tained at moderate cost. The alpha sulfite stock is designed as a general purpose paper for making work prints and as an intermediate when fast printing speed is not essential.

Microfilm Inspector 815

A unit designed for easier and more efficient microfilm inspection is available from **Atlantic Microfilm Corp.** Called FILMCHECK, it is constructed of a one-piece aluminum housing with a translucent white plexiglass 16 x 3″ screen. An 8X high-quality hand lens enables the operator to make detailed inspection of individual images. The unit, including geared rewinds, is available with or without a GRISWOLD DUPLEX SPLICER.

Microfilm Splicer 816

Recordak Corp. has announced a complete splicing outfit designed to repair and edit 16mm microfilms. Heart of the complete package is a KODAK PRESSTAPE SPLICER which uses Mylar adhesive strips. The tape used to join the film is packaged so that the operator does not touch the face of the film to complete the operation. Easy-to-use rewinds are connected by tierods to the splicer for quick setup.

Microfilm Printing Paper 817

A silver-sensitized paper which is said to fill the need for a fast microfilm enlargement material is being introduced by **Andrews Paper and Chemical Co.** The process, called ROLLACOPY, is especially suited for fine line reproduction because of its high resolving power. ROLLACOPY paper can be printed in any overhead microfilm reader and requires no darkroom. Exposure times are between 1 and 30 seconds. An inexpensive developing unit develops and stabilizes the prints in about 10 seconds. The paper is presently available on opaque and translucent bases.

Desk-Top Copier 818

A table-top copy machine about the size of a typewriter is now available from **Charles Bruning Co.** Designated the MODEL 120, the machine will copy translucent and semi-translucent material at a cost of 1¼ cents per copy. One unique feature of the 120 is the automatic separation of copies from originals before delivery. These are stacked separately without the need for handling by the operator. Designed for low-cost reproduction, the unit should be especially useful for copying small engineering and architectural drawings, order invoices and customer statements.

Automatic Photocopier 819

Cormac Chemical Corp. has introduced the CORMAC 500 which features freedom from solution handling. Another important feature is a separation mechanism which enables it to expose, develop and separate original from copy with less handling and waste of materials. The complete operation is timed at 19 seconds. The 500 is able to copy all sizes of originals up to 14 inches wide by any length and reproduces all colors. Price: $595.

Microfilm Processor 820

The well-known AIGLONNE automatic film processor is now being offered to the photographic field in the improved AMERICA model by the **Andre Debrie Division** of Belock Instrument Corp. The new model offers all the original photographic excellence and sturdy construction with the economies of American manufacture and the convenience of easy replacement of parts.

This unique machine uses a minimum of moving parts, is self-contained and may be operated by an unskilled attendant. The AMERICA is available in 16 or 35mm negative/positive or reversal machines and features leaderless threading. Processing itself is carried on in a channel composed of a series of elliptical molded PVC plastic tubes through which the film is said to "float." Solutions are stored in PVC or stainless steel tanks located in the lower portion of the machine. Another interesting feature of the AMERICA is the use of normal working solutions for replenishment. Used solutions are eliminated during the processing cycle at a ratio proportional to the surface area of the film processed. A compensated friction drive assembly drives the film with a minimum of film tension and may be preset or varied in speed while the machine is operating. Capacity of the 16mm machine is up to 1,400 feet per hour, while the 35mm model can handle a maximum of 750 feet per hour.

Standard equipment includes a built-in air impingement dryer, and a 400-foot daylight film magazine. An attachable dye-back removal unit is available for microfilm applications. □

STANDARDS

continued from page 38

4" x 6" or 6" x 8" file cabinets but, of course, it is not adaptable to any aperture or punch card system.

Therefore, 105mm is a system which allows reduction and restoration but which is primarily a reproduction medium. It permits considerable savings over full-size intermediates and standard filing space.

Recapitulating, 35mm is a convenient size for unitization in punch cards. It is small enough and cheap enough to permit its use for all types of reference purposes and, at the same time, is good enough for reduced size prints which can be read satisfactorily in most cases. Seventy millimeter is better for full size reproductions than 35mm and is only slightly more expensive. It can be unitized but is too large to be inserted into presently-used punch cards. The larger 105mm is basically a reduced size intermediate for the production of full size second originals. It can also be unitized but in standard filing systems rather than punch cards.

Each of the three sizes has its own advantages for engineering data storage but which is best can only be determined by individual requirements. □

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Microstrip cuts workload At Monroe County, N. Y.

BM (Before Microrecording), the County Clerk's office of Monroe County, N. Y., experienced a considerable lag in the preparation and forwarding of records to the state capital. The tremendous sale of license plates during the month of January, and the inability to obtain a sufficient number of accurate temporary typists accounted for the delay. Microrecording, however, has changed all that. A delay of several months has been reduced to a lag of less than a week through it.

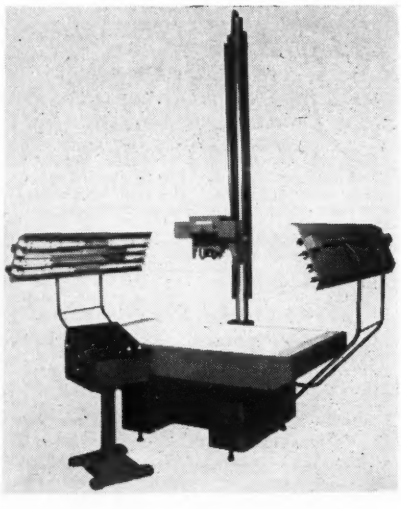
The microrecording technique practiced by Monroe County begins with an Eastman Model D planetary overhead camera and 35mm microfilm. The camera bed is equipped with a jig or layout board consisting of a piece of 32-gauge metal, painted black, upon which are glued 10 pieces of black felt. Ten registrations are placed in this frame. The copy board is equipped with a hinged glass cover which is lowered to hold the registrations perfectly flat upon the felt while they are being filmed. Large white plastic letters and numerals are placed at the edge of the jig for identification. Flasher panels with large letters are used to indicate various classifications of registrations.

The exposed film is packed and sent to a microfilm processor, who develops the film and from it makes a 35mm print in roll form. This Microstrip is returned to the County Clerk's office, where it is affixed to white six-by-nine cards in blocks of 100 registrations, or 10 frames of 10 applications each.

The reverse side of the white card is divided into 100 equal parts, each part being marked with the final digit of each registration. Thus, an individual who acquires a new car and transfers his plates to that new car will have his license plate placed in its appropriate space on the reverse side of the white card.

Microstrip is reduced at a ratio of 15 to 1 when put on film, but when placed in the viewer for ready reference, the image ratio is 22 to 1. This gives a fine image, covering twice the area of the original application.

Microstrip has eliminated searching through thousands of records for vital information so necessary to law enforcement. From a financial standpoint, the County Clerk's office has saved over $10,000 annually in salaries of temporary typists. It also released the permanent typists for other clerical work. □



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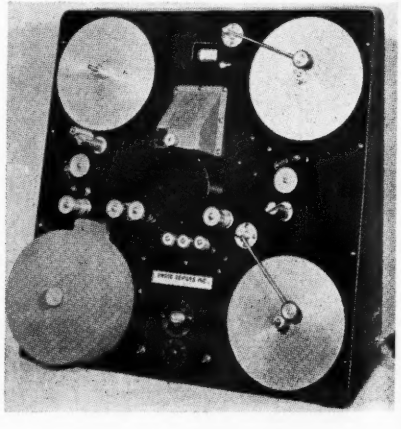

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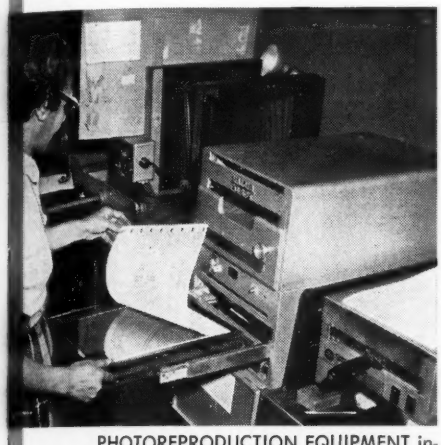
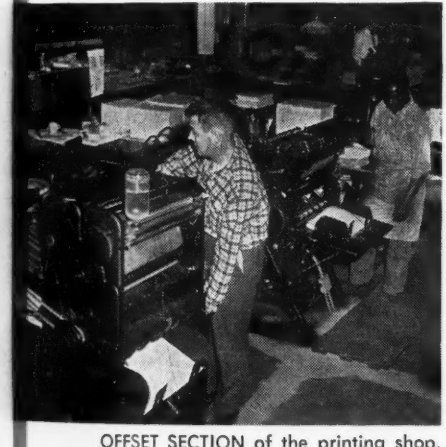
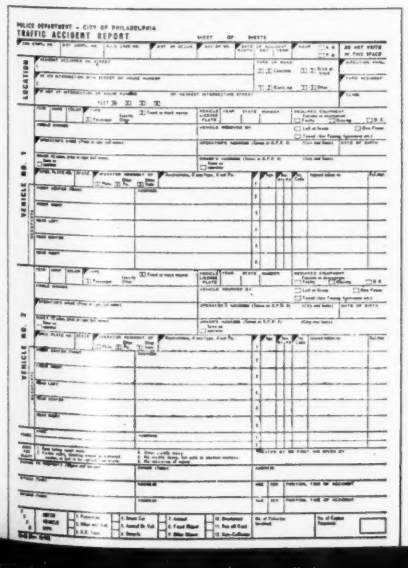


PHOTOREPRODUCTION EQUIPMENT includes camera, processor and heat fuser.



OFFSET SECTION of the printing shop.

ACCIDENT REPORT is a product of the city's in-plant offset department.



PHILADELPHIA FACE-LIFTING

Outdated municipal records systems are being overhauled to meet the needs of a growing city.

Philadelphia is an old city that has been undergoing a governmental systems — as well as a physical — face lifting.

Before adoption of the Philadelphia Home Rule Charter nine years ago, city government methods were horribly outmoded. Among other inefficiencies, the city and county of Philadelphia — they have the same boundaries — were burdened with 7,000 different forms.

Then the City Department of Records was created, and since its inception, it has blazed a number of trails in municipal records keeping, especially in forms control. Its Forms Control and Records Service Division through weeding out, redesign and consolidation has reduced the variety of forms to 4,200. Twenty-five per cent are snap-out, continuous, punched and other forms for which the Records Department provides complete specifications; 75 per cent are reproduced by photo-offset in the city's own print shop.

The print shop occupies 8,000 square feet on the ground floor of the Philadelphia Trade and Convention Center. It employs 25 men, who turn out about 50 million pieces of printed matter each year. About three million of these are cut sheet forms, cards and return addresses on envelopes — work originating in the forms and records division.

The traffic accident report form revised a year ago for the Police Department illustrates the city's use of in-plant offset and the unification and systemizing of forms control.

The old form was a letterpress-printed card on which a policeman at the scene of an accident described it in his own words. The officer turned the form into his district station, where it was typewritten with carbon copies. The system was slow, errors in transcribing were common and extra copies were hard to get.

Translucent Form

In a successful effort to streamline the system, the forms and records division designed a form on translucent paper that made full use of multiple choice questions. Policemen now do less descriptive reporting at the scene of the accident and give clear, standardized descriptions. The form goes directly to City Hall, where the Police central records unit punches IBM cards for its statistical files and sends the original report to the Records Department. Records makes copies by diazo — Bruning and Ozalid machines are used — and files the original. Anyone needing a copy can get it in minutes at a central location. Costs were cut, time saved, typing errors eliminated.

"The accident report form is a typical case of how in-plant reproduction of forms has paid the City of Philadelphia excellent dividends," said Commissioner of Records Charles A. Baker. "We get finished work of consistently high quality. Production

continued on page 45

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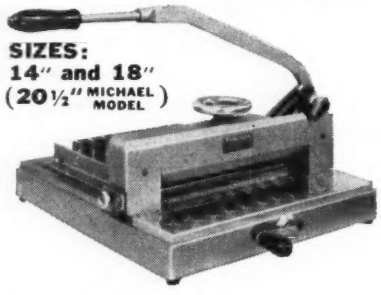

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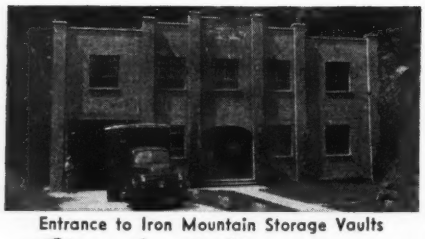

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Photo Map Volumes Aid Title Searchers

Transfer of ragged zoning maps onto Stabilene film has boosted efficiency in a New Jersey registrar's office.

by JILL ENGLISH
Assistant Editor

This spring when the Hudson County (N.J.) Registrar's Office moves from the Jersey City courthouse to more spacious headquarters in the new county administration building six new map books will move with it. These books are the basis of a new system of recording and retrieving information worked up by the registrar's office. The maps are reproduced photographically on Stabilene film and then bound together into books. It is hoped that they will make life a lot easier for land title searchers in Hudson County.

Formerly John Deegan, county registrar, heard complaints every time a homeowner referred to the old maps to search his deed or prove a zoning violation because the maps were often torn, smudged or otherwise illegible from frequent use. These complaints are expected to fall off when the new books are placed in wide use since Stabilene is dimensionally stable, moisture-proof, and easily cleaned with soap and water.

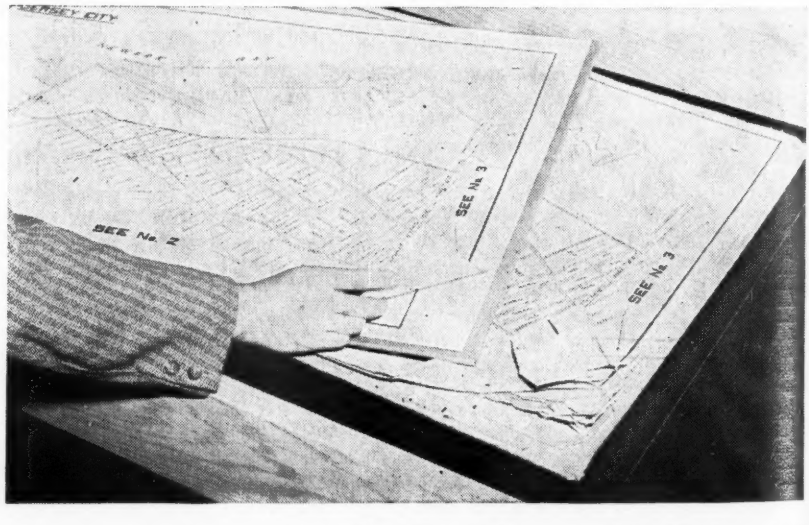
The old maps were lithographed on a fibrous material and, in most cases, not joined into books. Despite the increased bulk of the new maps (each is 29x37 inches in size) they are expected to last from three to ten times longer than the old ones. Here's how it happened that the maps were reproduced on the new material:

Contracts for Job

Over a year ago a salesman of reproduction materials visited the registrar's office and noticed the condition of the old maps. He suggested reproducing the maps on Stabilene, a product of Keuffel and Esser. The registrar liked the idea and Hudson County contracted for a reproduction house in Long Island City, N. Y.

continued on page 46

THE NEW AND THE OLD. A comparison of a fibre-type map book page less than four years old and the same map page made of Stabilene film. The new map pages cannot tear or fray and are easily cleaned with soap and water.



PHILADELPHIA

continued from page 43

and re-ordering have been speeded. Financial savings have been considerable."

Composition equipment in the Records Department "shop" includes two Varitype Corp. "Composomatics" and a Varityper "Headliner" that sets 14 point to 72 point display faces. These are owned by the City. Photoreproduction equipment — manufactured by Haloid Xerox — includes a No. 4 camera, a processor with tone tray and a heat fuser. The Department rents these machines, thus assuring itself of up-to-date models.

Offset equipment at the print shop includes two Whitins, two Multilith 1250's and two Davidsons. Each is used for work as small as 3 x 5 and as large as 8½ x 14. Larger jobs — from 11 x 17 to 14 x 21 — are handled on two Multilith 2066's and two larger Davidsons.

The smaller machines accommodate paper mats or metal plates. The larger ones use metal exclusively. Metal plates are made in the print shop's own photographic unit.

The most commonly used mat is the Remington Rand "Plasti-Plate." Though these normally yield 6,000 to 7,000 clear impressions, the print shop has gotten runs of 30,000 out of them. Shadings and other effects are produced with Zipatone and Artype pasteup material to save tedious drawing by hand. □

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TITLE SEARCHERS

continued from page 44

Within two weeks roughly 200 pages had been shipped to Long Island City and photographed with a large process camera on Kodalith film. After that the Kodalith negatives were printed on the new film by means of a vacuum frame and arc lights. County officials selected a buff background for easier readability. (This film also comes with a green or white background.)

Brown Print Image

Deegan found that Stabilene produces a peculiar type of "brown print" black line image as a result of mixing conventional blueprint and silver nitrate materials for the sensitizing solution. This solution is combined with a plastic emulsion to produce a hard, durable coating. Since the line image is actually imbedded in a plastic coating the map page is protected against accidental erasure and damage due to soiling.

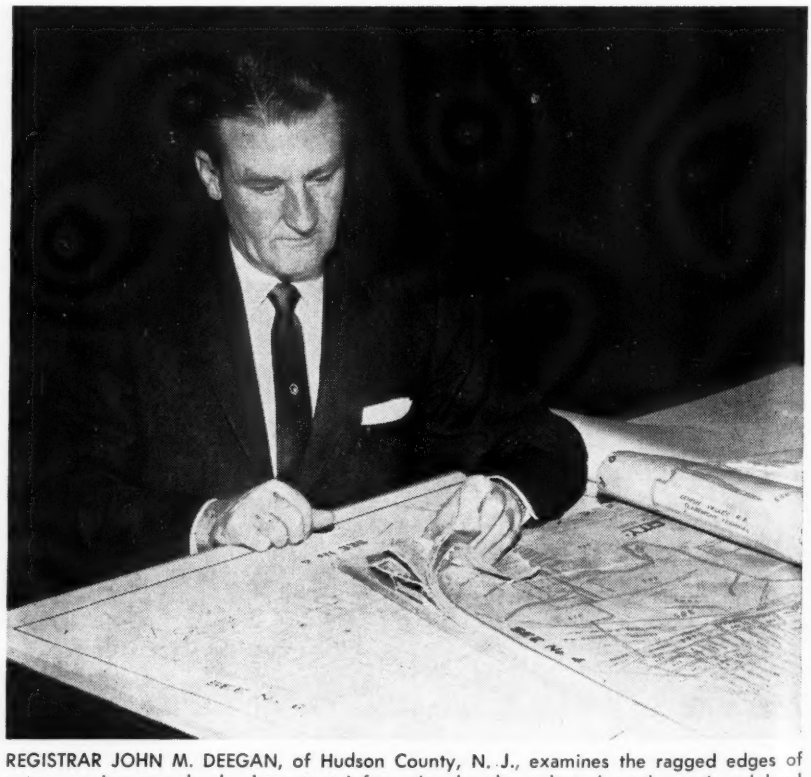
In the new Hudson County registrar's headquarters there will be wide counters to spread out the books, which will be stored in racks when not in use. There have been no boundary changes yet which would call for redrawing any of the pages. When this is necessary, changes can be made by using eradicator on either the negatives or the prints, and then opaquing.

Title searchers, who depend upon the map books as a major source of information, were consulted by Mr. Deegan and unanimously hailed the move as a solution to their problem of working with badly damaged zoning maps.

"The new plat books are a huge improvement over the old method, and make my job much easier," says Daniel J. Pendergast, a Jersey City Title Examiner.

He adds: "When important information was worn away examiners had to travel all over the county to complete a title search. This meant considerable expense and a great loss of time."

Hudson County is currently considering the possibility of reproducing all permanent county records on this highly durable material. □



REGISTRAR JOHN M. DEEGAN, of Hudson County, N. J., examines the ragged edges of a torn zoning map book. Important information has been lost through continued hard wear on the fibre-type pages.

DRIVE-IN BANK

continued from page 26

were made, providing three signatures cards for each account. This takes care of two drive-in windows and the sidewalk teller.

Upon opening a new account, the depositor signs only one card. Each afternoon the new cards are run through the photocopying machine, a Transcopy Duplex, and copies are distributed to the tellers. Precut card stock is used, and two signature cards are run off at a time. In about a minute, the bank has exact, same-size positive copies of the original signature card at a cost of just a few pennies.

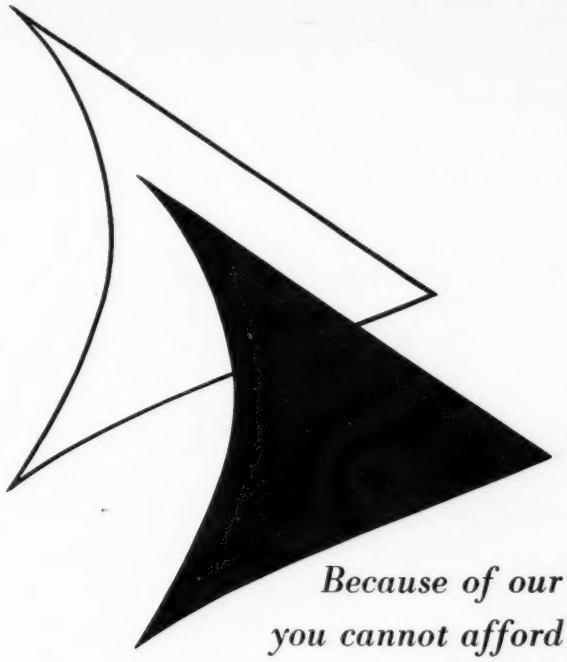
The bank now has signature cards available in the main bank, at the sidewalk teller's cage and the two drive-in windows, in addition to the master cards in the accounting department.

Moreover, the bank has found bonus uses for the photocopying unit. It is used to reproduce lengthy monthly reports for the board of directors, an operation which previously took up a great deal of typing time. Using the photocopying machine for this purpose also eliminates the necessity of double checking for possible errors. The bank also used the photocopying machine for making copies of canceled checks, ledger accounts, emergency statements for customers and copy forms which they might run out of unexpectedly. □

INDUSTRY NEWS

continued from page 7

organization of *Burroughs Corporation* has been announced "to fully capitalize on the increasing demand for . . . data processing equipment and systems." The changes, expected to result in new ideas and products, went into effect March 1. . . . Local branch offices of *IBM* now carry information on modifying IBM equipment to handle aperture punching in IBM cards. □



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A VITAL SERVICE

for the Microphotographic Industry

The National Microfilm Association was organized in 1943 and subsequently incorporated in the State of Michigan as a non-profit Corporation. Its purposes are to advance the interests of the micro-reproduction industry by providing a channel of communication for producers of equipment and supplies, service companies and for users whether individuals or companies. Through its educational program, the Association has worked to stabilize and improve technical production and use of microphotography, and to keep producers and users alike fully abreast of latest developments. Membership in the Association is open to all corporate groups and individuals interested in the general field. Inquiries should be directed to:

Executive Secretary

NATIONAL MICROFILM ASSOCIATION

P. O. Box 386

Annapolis, Maryland

Tear off and mail

NATIONAL MICROFILM ASSOCIATION

P. O. Box 386

Annapolis, Md.

Gentlemen:

Please send, without obligation to me, complete information about your association. I would also like to receive a FREE copy of the N. M. A. Handbook.

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DIRECTORY

continued from page 39

13b, 14a. Reduction ratios: 3X-10X.

Keuffel & Esser Co.
679 St. James St., West
Montreal 3, P. Q.
(same as above)

Vancal Reproductions, Ltd.
1170 Robson St.
Vancouver, B. C.
(same as above)

Riley's Reproductions Ltd.
631-8th Ave., S.W.
Calgary, Alberta
1ab, 2ab, 3abc, 4ac, 5ab, 6abc, 7abh, 8, 9, 10abe, 11ae, 12-abefg, 13ab, 14ab, 15.

Standard Microfilming Co., Ltd.
605 Oakwood Ave.
Toronto
1ab, 2ab, 3abc, 4abc, 5ab, 7abcef, 8, 9, 10abe, 11ade, 12abefg, 13b, 14a, 15.

West Canadian Microfilm Ltd.
343-11th Ave., S.W.
Calgary, Alberta
1abd, 2ab, 3abc, 4abc, 5ab, 6abc, 7abde, 8, 9, 10abcde, 11a, 12-abcdeg, 13ab, 14ab, 15.

Canadian Microfilm Co., Ltd.
2933 St. James St. East
Montreal 1, Quebec

ADDENDA

Louisville Microfilms, Inc.
1318 Bardstown Rd.
Louisville, Kentucky
1abc, 2ab, 3abc, 4bc, 5ab, 6abc, 7abcfg, 8, 9, 10abce, 11ade, 12abcefg, 13ab, 14ab, 15.

Kentuckiana Microfilm
3433 Warner
Louisville, Kentucky
1ab, 2ab, 3abc, 4bc, 5b, 6ab, 12abefg, 14b.

Graphic Microfilm Corp.
115 Liberty St.
New York, N. Y.
1abc, 2ab, 3abc, 4abc, 5ab, 6abc, 7abcde, 8, 9, 10abcdefg, 11abcde, 12abcdefg, 13ab, 14ab, 15.

Ana-Tec Inc.
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Los Angeles 25, Cal.

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Xerography Speeds Olympic Results

Xerography, a key element in many microfilm communications systems, took on a new role recently. It was part of a unique communications system which helped speed the results of the Winter Olympic games to every corner of the world within three minutes after a contestant crossed the finish line.

The swift results poured out of an Olympic Data Processing Center and Press Room which combined electronic computers, Xerox cameras and processors, calculators and the other tools of modern communication. A continuous flow of up-to-the minute scores and official standings was accomplished by the following steps:

At the end of each event, details were electronically recorded and fed into giant computers. Results of a single contest and the order of rank was punched automatically onto teletype tape for transmission to the judges' stand and remote press centers.

Simultaneously, the results were printed by the computers at the rate of 150 lines per minute directly onto 11 x 7-inch offset paper masters for short-run duplication. These were printed out in English and in French (the official language of the games) and distributed immediately to waiting Olympic officials.

One of the first copies from the computer was reduced to conventional 8½ x 11 inch bulletin size by Xerography. Copied onto smaller offset masters, the results were then run off in volume in the same room. These copies, exactly like the original from the computer except for overall size, were then rushed to the press and thousands of spectators. This method was determined to be the only one which would allow spectators to actually read final results within minutes.

The elimination of manual transcription insured fast, accurate communication of precise scoring data. The high-speed duplicating system eliminated all retyping and the chance of human error in tabulation; results appeared exactly as when they left the electronic computer.

The Xerographic copying units and operators for the units were donated to the Olympic games by Haloid Xerox, Inc.

Over 120,000 bulletin sheets were printed daily during the Winter games using offset masters prepared by Xerography.

The official final results represented the greatest achievement of automation at the Olympics. The report, which formerly took many months to compile and print, was readied in three- and one-half hours; in plenty of time for the almost 5,000 Olympic officials, athletes and representatives of the press to take home with them at the close of the games. □

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For sale due to illness. Interested parties please write to Box 200, Data Processing & Microfilming Systems c/o Industrial Photography, 10 East 40 Street, New York 16, N.Y.

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FOR MICRO FILM ●
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NEWSMAKERS

John K. Boeing

The newsmaker of the month is the recipient of the National Microfilm Association's Annual Award of Merit, John K. Boeing, newly appointed chairman of the board of Recordak Corporation. Boeing was cited as "one of the pioneers of microfilming" and received the award for "distinguished service to the microfilming industry." He joined Recordak in 1928 and has been active in the promotion of the industry throughout the 30-plus years.

Monroe E. Brand

Monty Brand, who played a major role in the creation of the Knights of Columbus Vatican Microfilm Library, was recently cited by St. Louis University for his "untiring effort, cooperation and efficiency" in this project. Believed to be the most important microfilm library in the world, it comprises 11,000,000 pages of microfilm reproductions of many of the most important manuscripts in the world. The originals are housed in the Vatican Library in Rome and are invaluable to historians. The project of duplicating the collection was begun over a decade ago.

James L. McPherson

This year's census will be the most systemized in history and the key will be FOSDIC, an electronic wonder which automatically translates information from microfilm to magnetic tape for direct input into electronic computers. Key man in the development of the project at the Census Bureau is James L. McPherson, a long-time system expert who has been working on the problem since the 1950 census.

Raymond M. Hessert

This month Raymond M. Hessert was made director of the Photo Records Division of Remington Rand. An inveterate inventor, Mr. Hessert perfected the first camera able to photograph both sides of a document. Today this invention has been taken over by Remington Rand and is marketed as the Film-a-Record camera.